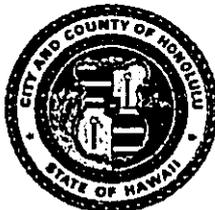


DEPARTMENT OF GENERAL PLANNING
CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET
HONOLULU, HAWAII 96813

FRANK F. FASI
MAYOR



BENJAMIN B. LEE
CHIEF PLANNING OFFICER
ROLAND D. LIBBY, JR.
DEPUTY CHIEF PLANNING OFFICER

WM/DGP 90/KL-4

February 20, 1990

Honorable Marvin T. Miura, Director
Office of Environmental Quality Control
State of Hawaii
465 South King Street, Room 104
Honolulu, Hawaii 96813

Dear Dr. Miura:

NEGATIVE DECLARATION

LOCATION

Kahuku, Oahu
Tax Map Key: 5-6-02: Portion
of parcel 16

PROPOSED ACTION

To redesignate 4 acres from
Agriculture to Residential on
the Koolauloa Development Plan
Land Use Map

CONTACT

Mr. Clinton Churchill
Chief Executive Officer
The Estate of James Campbell
828 Fort Street Mall, Suite 500
Honolulu, Hawaii 96813-4380

REASONS SUPPORTING DETERMINATION

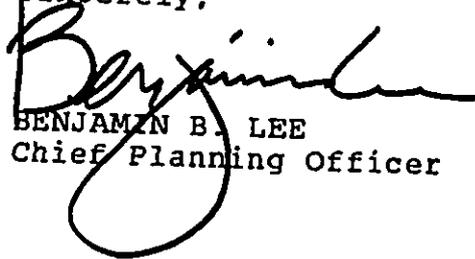
The anticipated effects of the proposed action based on the attached assessment are not significant enough under the criteria of Section 11-200-12 of the EIS Rules to warrant the preparation of an EIS.

This determination does not constitute approval of the applicant's request for a Development Plan amendment or subsequent development approvals.

Honorable Marvin T. Miura, Director
Office of Environmental Quality Control
Page 2
February 20, 1990

Please call Bill Medeiros at 527-6089 if there are any questions.

Sincerely,



BENJAMIN B. LEE
Chief Planning Officer

BBL:js

cc: Clinton Churchill
William Wanket

Attachments

1990-03-08-0A-FBA

FILE COPY

*Development Plan Amendment
Environmental Assessment
Land Use Boundary Change Application*

*** ~~PROPOSED KAHUKU~~
~~RESIDENTIAL~~ ***

Kahuku, Oahu, Hawaii

**Tax Map Key:
5-6-02: Portion of 16**

Applicant:

The Estate of James Campbell

January 1990

WILLIAM
E.
WANKET
INC.

Land Use Consultant

January 9, 1990

Mr. Ben Lee
Chief Planning Officer
Department of General Planning
Municipal Office Building, 8th Floor
650 South King Street
Honolulu, Hawaii 96813

**RE: SUBMISSION OF A KOOLAULOA DEVELOPMENT PLAN AMENDMENT
AND REQUEST FOR A LAND USE BOUNDARY CHANGE - KAHUKU -
TMK 5-6-02: PORTION OF 16
APPLICANT: THE ESTATE OF JAMES CAMPBELL**

Dear Mr. Lee:

Enclosed are (4) copies of a *Development Plan Land Use Map Amendment and Request for a Land Use Boundary Change* for property in Kahuku owned by the Estate of James Campbell.

The property adjoins residential zoned lands, and it is contiguous to lands in the Urban District. The request for a Land Use Boundary Change to Urban is less than 15-acres. We are requesting concurrent processing of the Land Use Boundary Change with the Development Plan Amendment, pursuant to your Rules and Regulations,

The *Development Plan Amendment and Environmental Assessment Report* has been prepared to follow DGP's content guidelines for submitting such applications. The report includes the following technical reports:

- Air Quality Impact
- Botanical Survey
- Agricultural Impact
- Traffic Impacts
- Fauna Survey
- Archaeological Survey
- View Assessment

We would greatly appreciate your acceptance of the Application for processing during the 1990 Annual Review, and for your determination of a Negative Declaration for the project.

Sincerely,


William E. Wanket

enclosures

Pacific Tower
Suite 660
1001 Bishop Street
Honolulu, HI 96813
Phone
(808) 533-4937
FAX 521-5410

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- C. PROPOSED KAHUKU RESIDENTIAL PROJECT: IMPACT ON AGRICULTURE
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(Phillip L. Bruner)
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(Michael S. Chu)

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DGP REF. NO.:
NB AREA: Koolauloa #28
ACREAGE: 13.319/11.3
TMK: 5-6-02: Portion 16

KOOLAULOA
Development Plan Land Use Amendment and State Land Use Boundary Change Being Considered
Summary Sheet

AMENDMENT/PROJECT INFORMATION

Amendment Request: Designate certain lands in Koolauloa from Agriculture to Residential (13.3 acres).

Land Use Boundary Request: Agriculture to Urban (11.3 acres).

Location: In the Kahuku community on the north side of Kamehameha Highway, approximately one-fourth mile north-east of the old Kahuku sugar mill (see *Figure 1*).

Owner: The Estate of James Campbell

Requested by: Owner

Basis for Request: To provide lands for a proposed residential subdivision.

Type of Project: A residential subdivision is being proposed that would contain approximately 87 single-story dwellings.

Impact on Provision on Housing: The development will provide needed housing to serve the planned economic growth of the area, especially Turtle Bay Resort Expansion.

DGP REF. NO.:
NB AREA: Koolauloa #28
ACREAGE: 13.319/11.3
TMK: 5-6-02: Portion 16

EXISTING CONDITIONS

Land Use: Occasional grazing occurs on the land.

Structures: The site contains abandoned farming sheds and an abandoned antenna site.

ALISH: Not rated.

Soil Features: Jaucus Sand (JAc)
Keaau Clay (KmbA)

Possible Constraints: The National Wildlife Refuge (Kii Unit) is located nearby.

PRESENT PLAN/ZONING DESIGNATIONS

State Land Use: Agriculture/Urban (See *Figure 2*)

DP Land Use Map: Agriculture/Residential (See *Figure 3*)

DP Public Facilities Map: See *Figure 4*

DP Special Provisions: None

Zoning: AG-2/R-5 (See *Figure 5*)

KOOLAULOA
Development Plan Land Use Amendment and State Land Use Boundary Change Being Considered
APPLICATION

The application is for a Koolauloa Development Plan Land Use Map Amendment, together with a concurrent application for a State Land Use Boundary Change to Urban (State Legislature in 1986 granted to the Counties the authority to approve Boundary Changes for parcels less than 15-acres in size).

The area under review is in the Kahuku Community and stretches on the north side of Kamehameha Highway, approximately one-fourth mile northeast of the old Kahuku Sugar Mill and is contiguous with adjacent residential zoned land being developed by the Kahuku Village Association and the City.

Although the proposed residential development consists of 16.3 acres, 3-acres are already designated on the Koolauloa Development Plan for Residential, and zoned R-5 Residential under the Land Use Ordinance. The remaining 13.3 acres are designated Agriculture on the Koolauloa Development Plan, of which 11.3 acres are State classified Agriculture by the State Land Use Commission.

The proposed redesignation to Residential and Urban is intended for a proposed subdivision of approximately 87 single-family homes that will be targeted for sale to residents and employees of the region.

The information provided follows the application format of the Department of General Planning.

PROPOSED KAHUKU RESIDENTIAL

I. BACKGROUND

A. ESSENTIAL INFORMATION

1. **Applicant:** The Estate of James Campbell
828 Fort Street Mall
Suite 500
Honolulu, Hawaii 96813

Phone (808) 536-1961
2. **Agent:** William E. Wanket, Inc.
1001 Bishop Street
Pacific Tower, Suite 660
Honolulu, Hawaii 96813

Phone (808) 533-4937
3. **Land Owner:** Same as Applicant.
4. **Request:**
 - 1) Redesignate land from Agriculture to Residential
 - 2) Change State classification from Agriculture to Urban
5. **Area:**
 - 1) DP change, 13.319 acres
 - 2) Boundary change, 11.3 acres
6. **Location:** In the Kahuku community on the makai side of Kamehameha Highway, approximately one-fourth mile from the old Kahuku Sugar Mill — see *Figure 1*.
7. **Tax Map Key:** 5-6-02 (Por) 16
8. **Existing Uses:** The area is primarily vacant with occasional grazing. Several abandoned structures remain on the site.
9. **State Land Use:** Agriculture/Urban — see *Figure 2*.
10. **DP Designation:**
 - a. **Land Use:** Agriculture — see *Figure 3*.
 - b. **Public Fac.:** None — see *Figure 4*.
11. **Zoning:** AG-2 General Agriculture - see *Figure 5*.
12. **Proposed Development:** 87-lot residential subdivision — see *Figure 9*.

PROPOSED KAHUKU RESIDENTIAL

B. DESCRIPTION OF PROPERTY

1. Property Boundary

The site is a portion of Lots 968-A and 969 and Exclusion 4 of Land Court Application 1096 and portions of Lots 28 and 29 of File Plan 1406, Kahuku, Oahu, Hawaii. See *Figure 1*.

The northwest end of the Kahuku County Golf Course lies along the east side of the site, while the north side adjoins open agricultural lands. The National Wildlife Refuge (Kii Unit) is located approximately one-third mile northwest of the site. A sewage treatment plant, mixed agricultural crops and aquaculture ponds also exist on the Kahuku end of this agricultural plain. (See *Figure 6*).

2. Topography/Slope

The subject property, lies on the long, flat Kahuku Plain. Elevations range from a high of 14 feet in the northeast to a low of 2 feet in the northwest. The low area forms the natural drainage pattern for the general area to East Ohia Stream to the northwest.

3. Existing Uses

The site is vacant except for occasional grazing. Abandoned structures remain on the site.

4. Soils (See Appendices C and F)

According to the Soil Survey by the U.S. Department of Agriculture Soil Conservation Service, soil on this property has been classified as Jaucus sand (JaC) described as single grain, pale brown, sandy and more than 60 inches deep. Wind erosion is noted to be severe in areas cleared of vegetation. This does not seem to pose a problem as much of this soil type will be covered by embankment material. The Jaucus Series covers approximately 85% of the project area.

Keaau Clay, Saline (KmbA). This dark brown clay occurs in depressions adjacent to the ocean or in pockets within limestone areas. Runoff is slow and the erosion hazard slight. This series covers 15% of the site. In some areas of the southern (*mauka*) portion, grading has exposed and eroded the limestone substrate, which most likely underlies most of the plain. No sand dunes are on the property, though tall dunes can be seen approximately 800 feet from the north/northwest extent of the parcel. A loose mix of sand, clay, and limestone aggregate occurs within 300 feet of the subject property.

5. Location Map

See *Figure 1*.

PROPOSED KAHUKU RESIDENTIAL

6. Topo Map

See Figure 12.

7. Project Layout

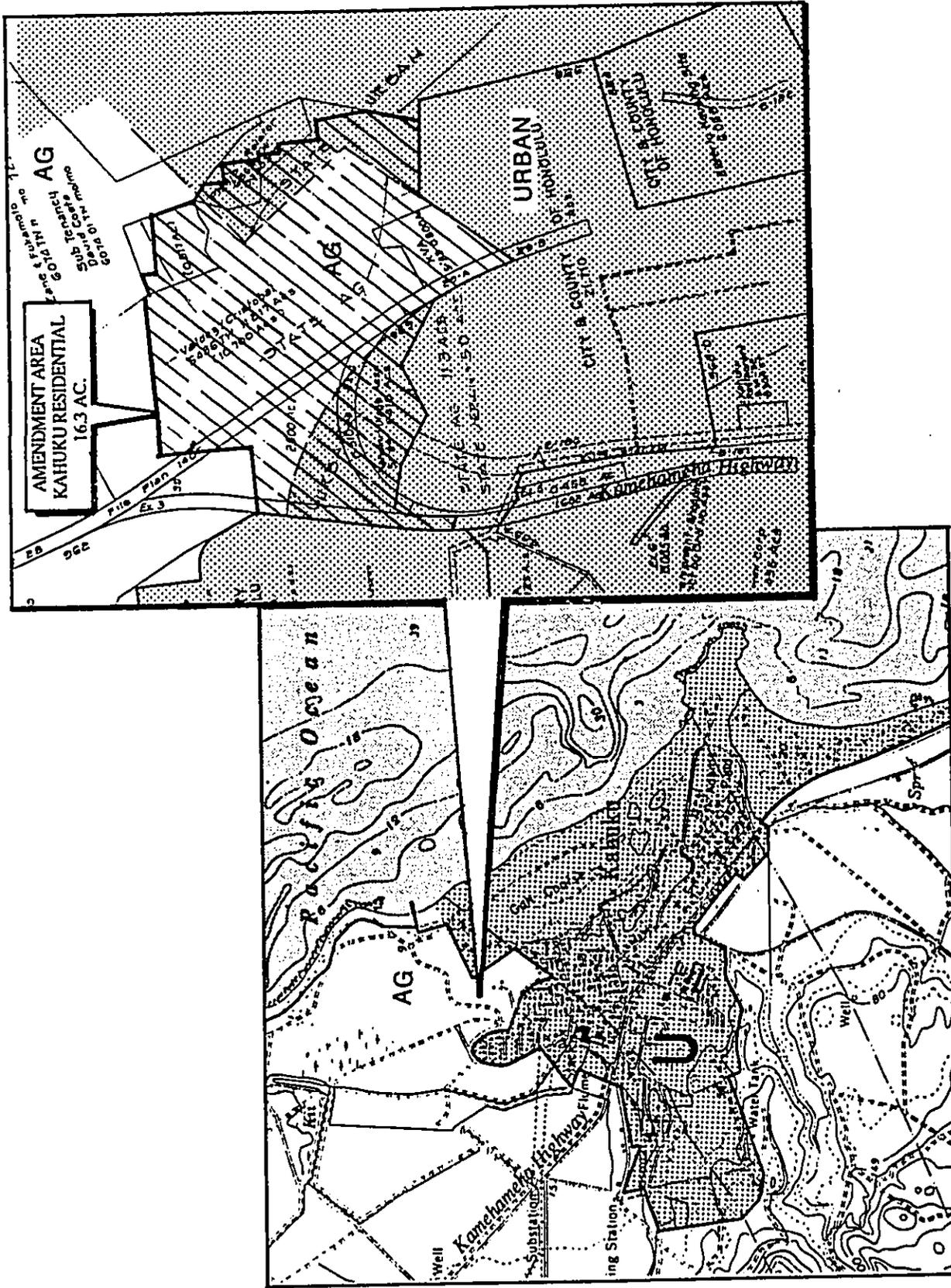
It is proposed, that the development will include an estimated 87 single-story, one- two- and/or three-bedroom, single-family dwellings. Site improvements will be similar to those developed for the Kahuku Village Makai Development, with on-site drainage, sewer and domestic water systems being provided. *See Figure 9.*

PROPOSED KAHUKU RESIDENTIAL

II. FIGURES

For the convenience of the reader, a list of the Figures contained in this section and referenced throughout the text by number is provided below:

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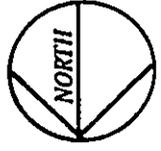
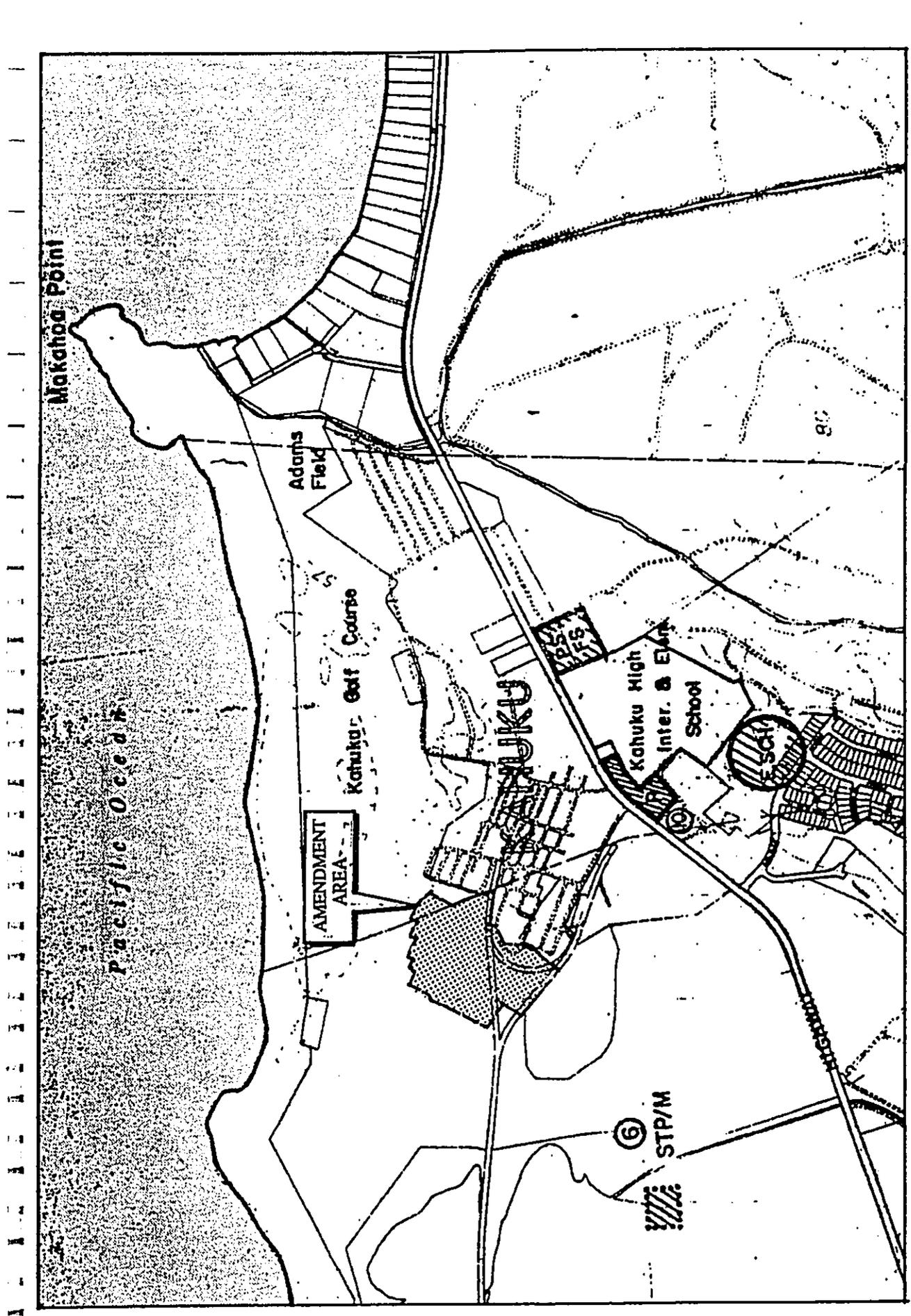


prepared for: The Estate of James Campbell
 prepared by: Michael S. Chiu, Land Architect

Kahuku Residential
 STATE LAND USE MAP

FIGURE 2

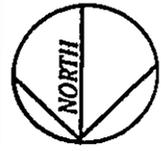
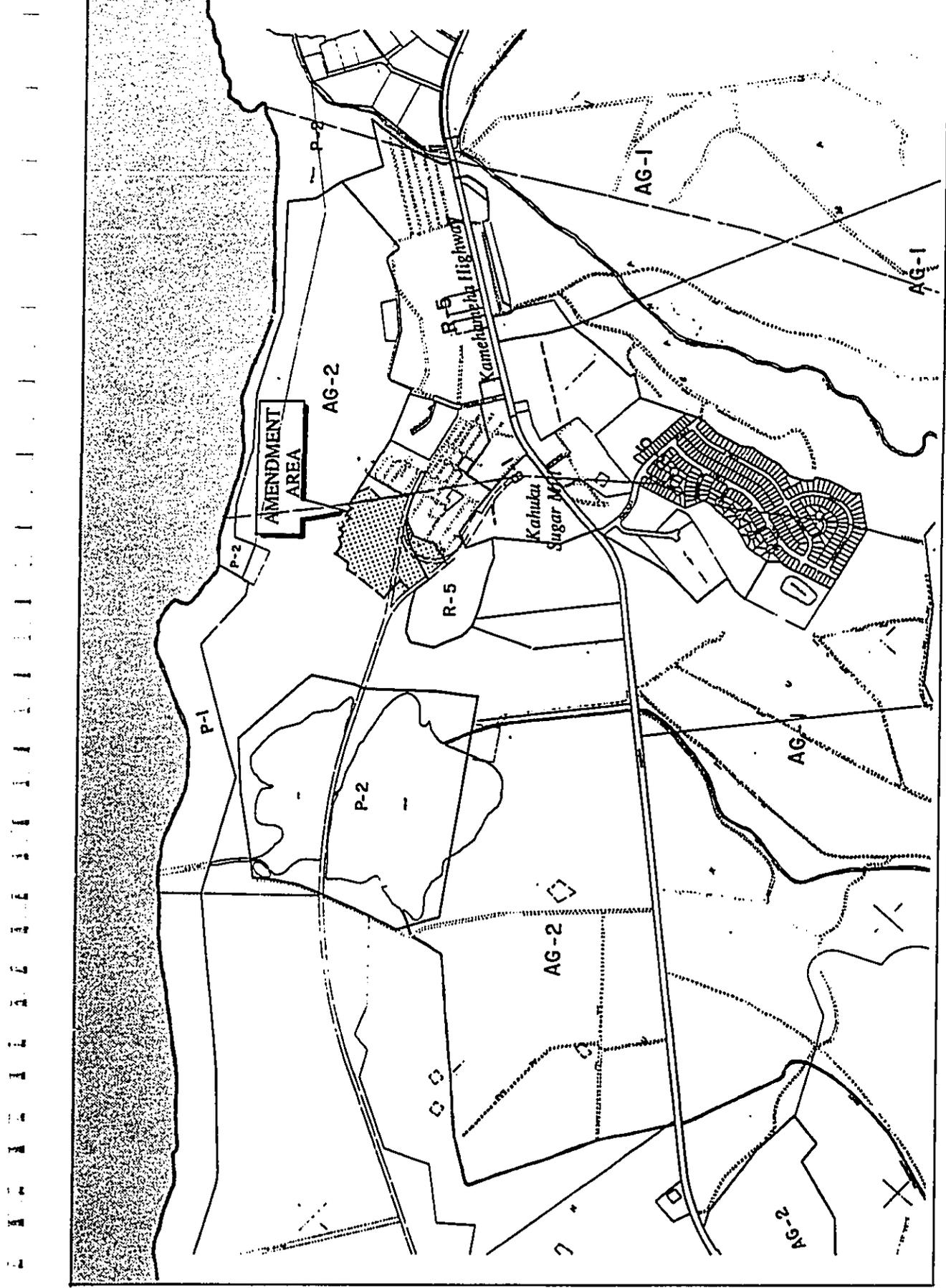




prepared for: The Estate of James Campbell
 prepared by: Michael S. Chiu, Land Architect

**Kahuku Residential
 KOOLAULOA DP PUBLIC FACILITY MAP**

FIGURE 4

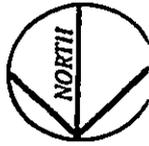
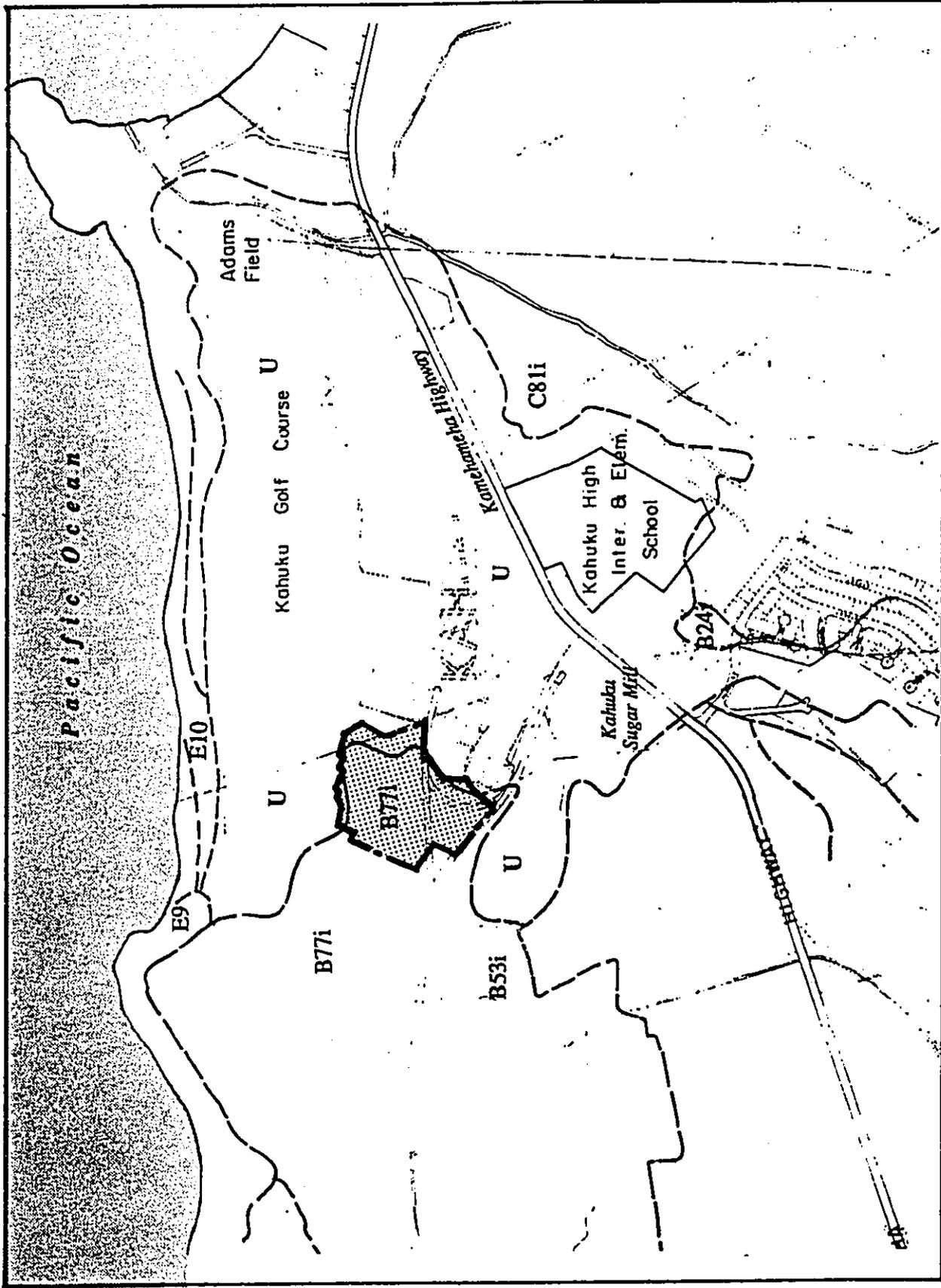


prepared for: The Estate of James Campbell
 prepared by: Michael S. Chu, Land Architect

**Kahuku Residential
 EXISTING ZONING**

FIGURE 5

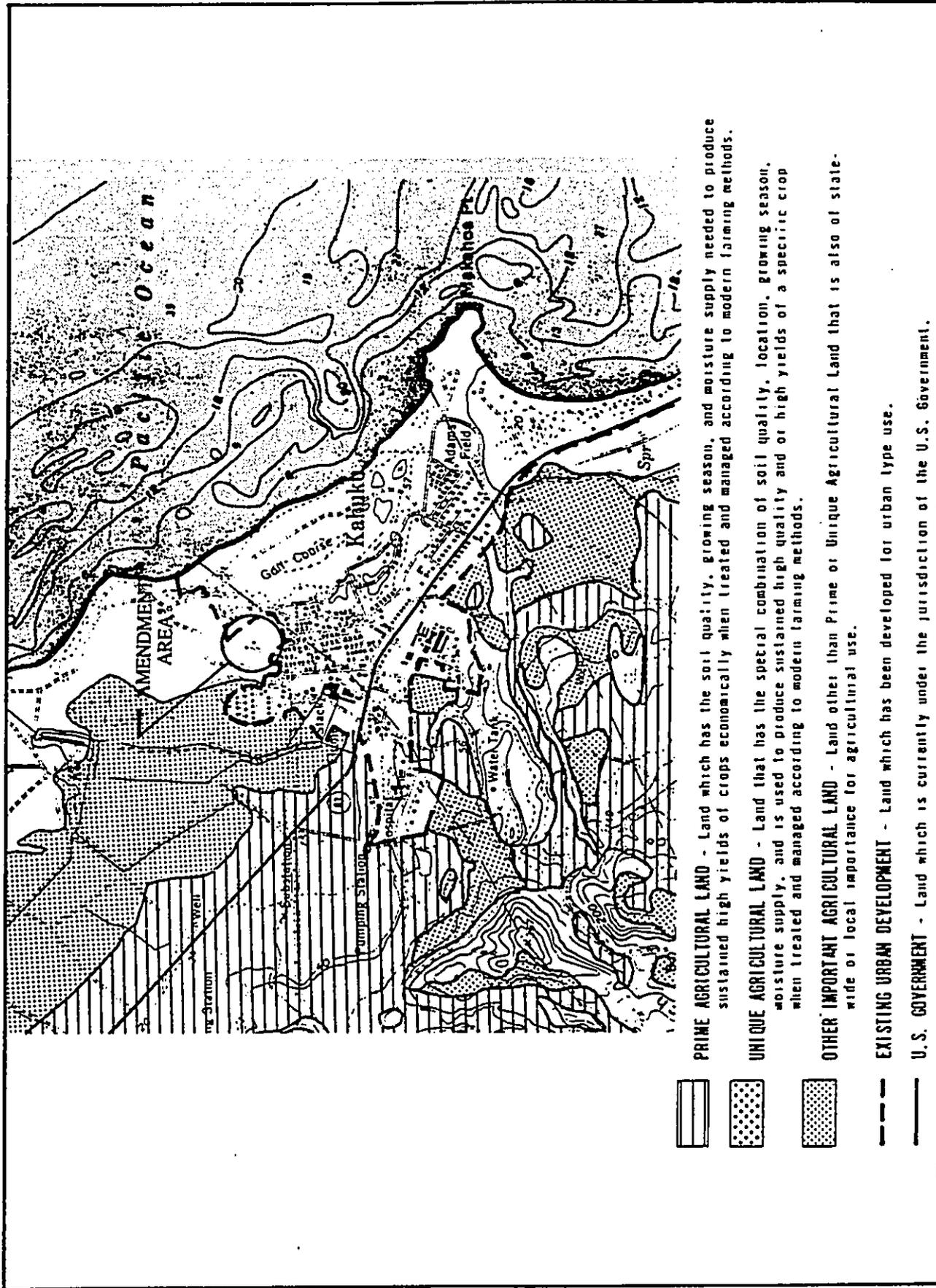
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100



Kahuku Residential
SOIL CLASSIFICATION
 LAND STUDY BUREAU

Prepared for: The Estate of James Campbell
 Prepared by: Michael S. Chu, Land Architect

FIGURE 6



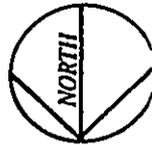
PRIME AGRICULTURAL LAND - Land which has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops economically when treated and managed according to modern farming methods.

UNIQUE AGRICULTURAL LAND - Land that has the special combination of soil quality, location, growing season, moisture supply, and is used to produce sustained high quality and or high yields of a specific crop when treated and managed according to modern farming methods.

OTHER IMPORTANT AGRICULTURAL LAND - Land other than Prime or Unique Agricultural Land that is also of state-wide or local importance for agricultural use.

EXISTING URBAN DEVELOPMENT - Land which has been developed for urban type use.

U.S. GOVERNMENT - Land which is currently under the jurisdiction of the U.S. Government.



**Kahuku Residential
AGRICULTURAL LANDS OF
IMPORTANCE TO THE STATE OF HAWAII**

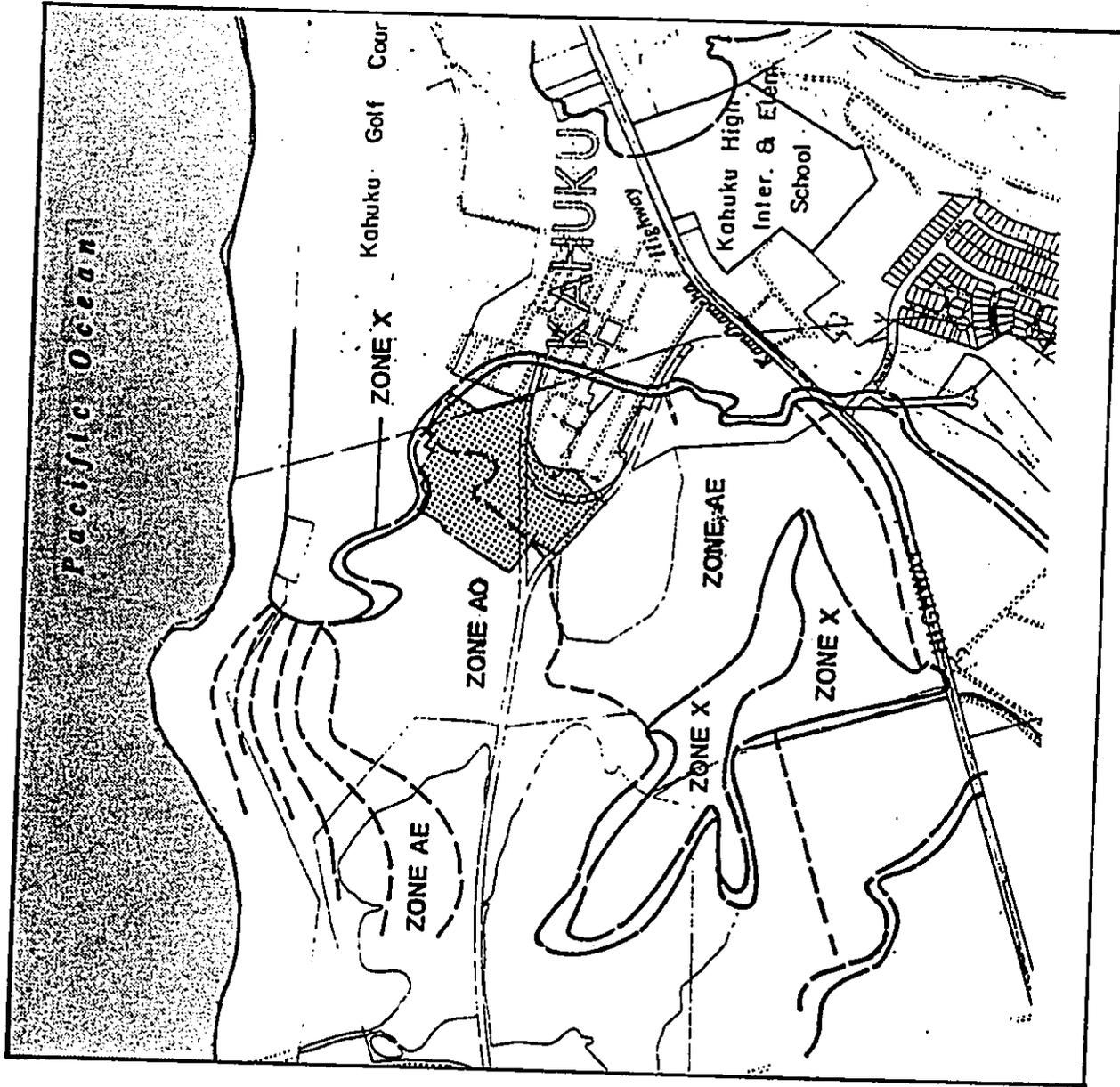
prepared for: *The Estate of James Campbell*
prepared by: *Michael S. Chu, Land Architect*

FIGURE 7

FEDERAL INSURANCE RATE MAP

LEGEND

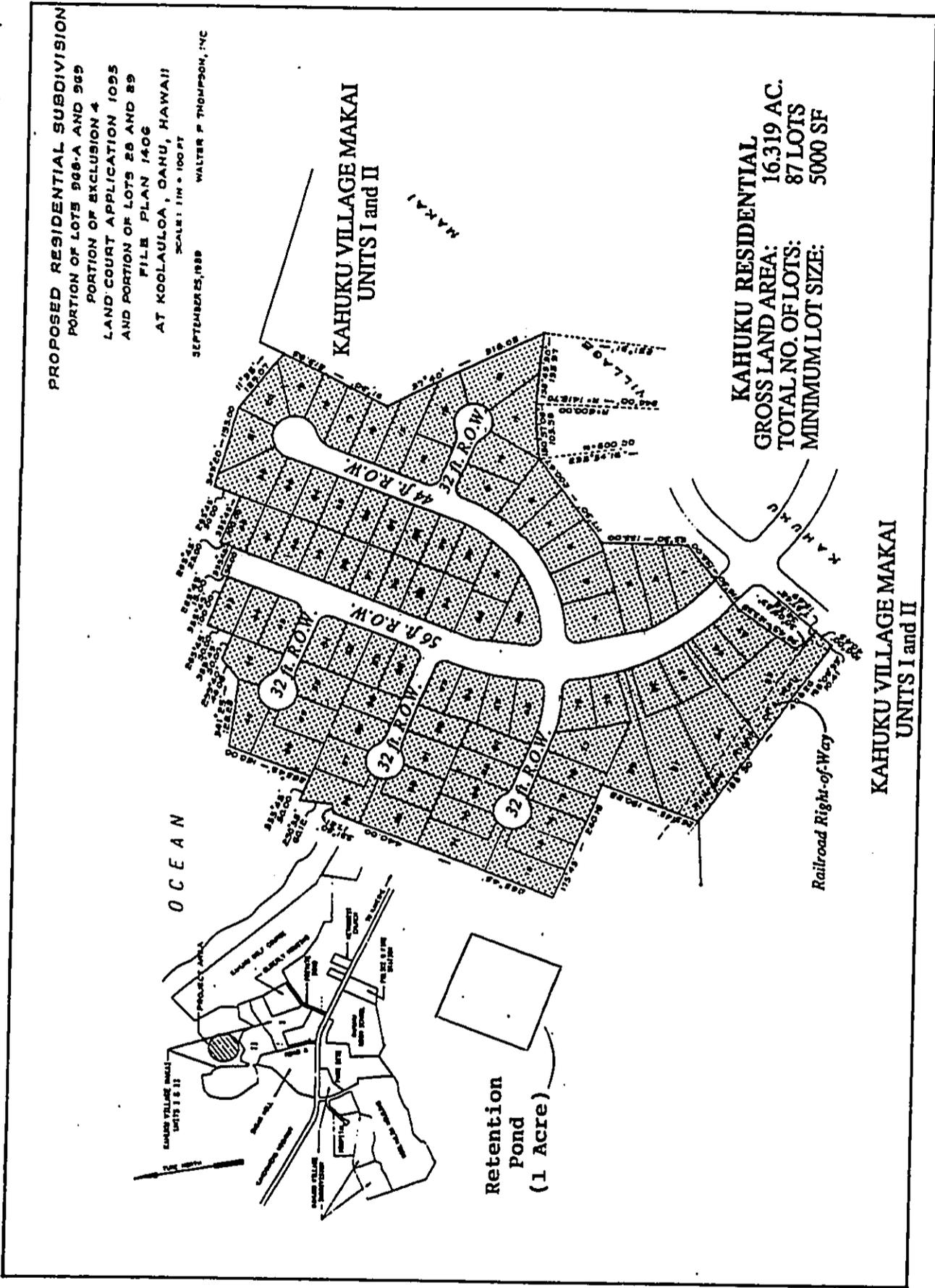
- SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD**
- ZONE A No base flood elevations determined
 - ZONE AE Base flood elevations determined
 - ZONE AH Flood depths of 1 to 3 feet (usually areas of ponds); base flood elevations determined
 - ZONE AO Flood depths of 1 to 3 feet (usually where flow on sloping terrain); average depths determined. For areas of about 1/4 square mile, elevations are determined.
 - ZONE A99 To be protected from 100-year flood. Federal flood protection system under construction; no base elevations determined
 - ZONE V Coastal flood with velocity hazard (wave action); no base flood elevations determined
 - ZONE VE Coastal flood with velocity hazard (wave action); base flood elevations determined
- FLOODWAY AREAS IN ZONE AE**
- OTHER FLOOD AREAS
 - ZONE X Areas of 500-year flood, areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile, and areas protected by levees from 100 year flood.
- OTHER AREAS**
- ZONE X Areas determined to be outside 500-year flood plain.
 - ZONE D Areas in which flood hazards are undetermined
- Flood Boundary
 - Floodway Boundary
 - Zone D Boundary
 - Boundary Dividing Special Flood Hazard Zones, and Boundaries Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones
 - Base Flood Elevation Line (Elevation in Feet)
 - Cross Section Line
 - Base Flood Elevation in Feet Where Uniform Within Zone*
 - Elevation Reference Mark



Kahuku Residential
FLOOD ZONE MAP

prepared for: The Estate of James Campbell
prepared by: Michael S. Chu, Land Architect

FIGURE 8



Kahuku Residential
SITE PLAN

*prepared for: The Estate of James Campbell
prepared by: Michael S. Chu, Land Architect*

FIGURE 9

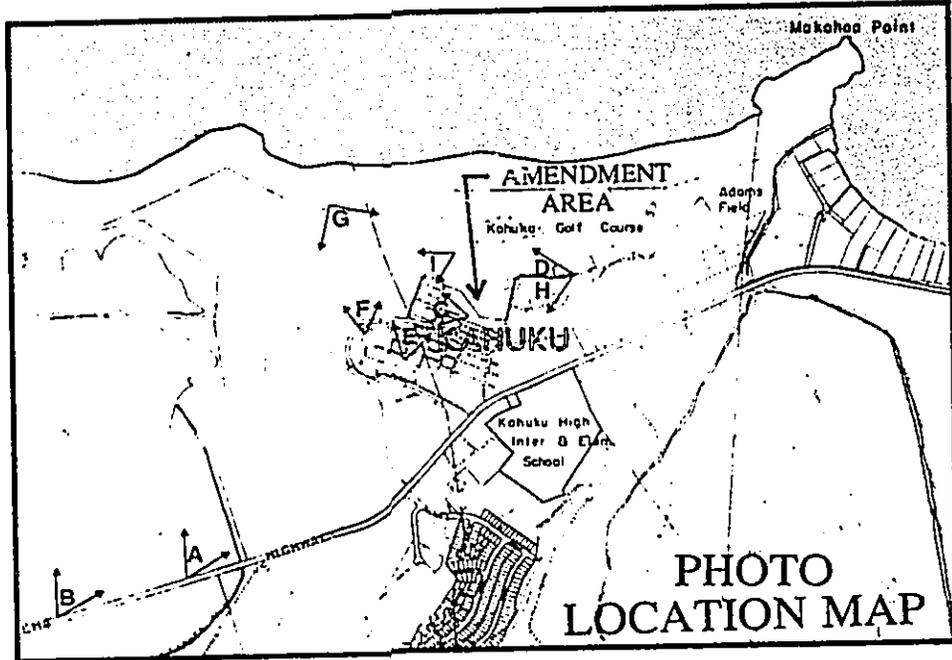
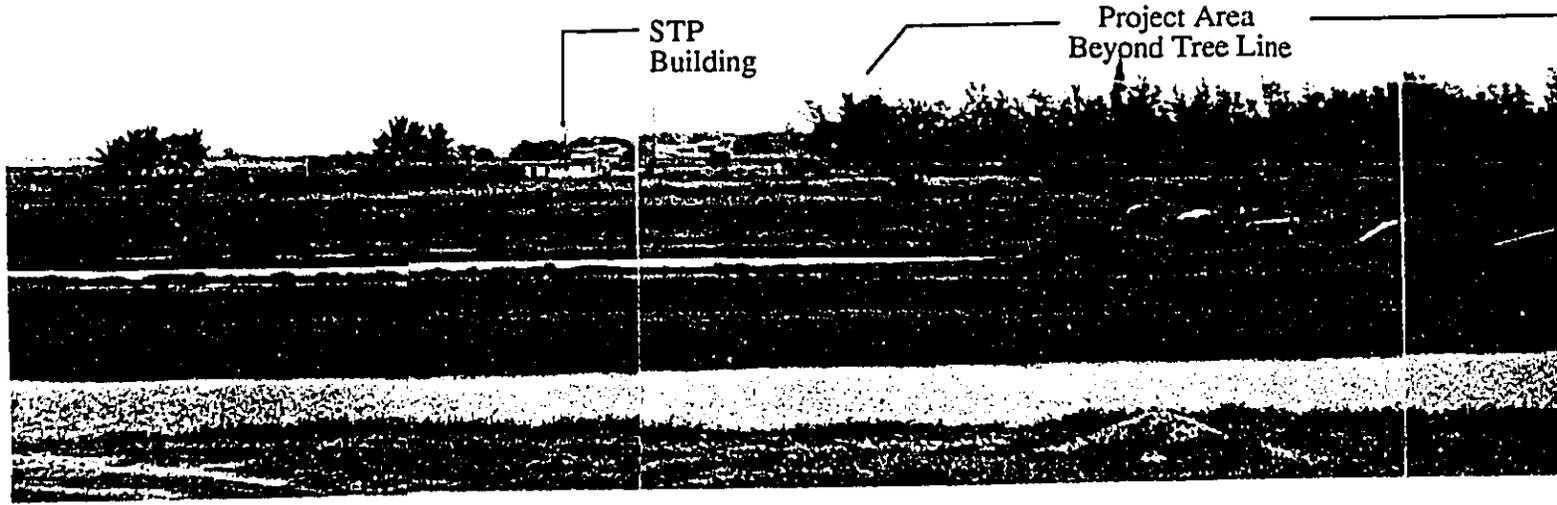


Photo A

Coastal highway view from Kamehameha Highway across open space/agricultural land (residential) from Coastal View Study. Amendment area is to the right of tree line. Existing sewer treatment plant is to the left of tree line. Smoke stack at Kahuku mill beyond.

Photo B

Coastal highway view of project area looking north from Kamehameha Highway approximately 1/2 mile northwest of Kahuku. Aquaculture ponds are the predominant visual feature within this open area.

Photo C

North-facing view along 1st Avenue, immediately adjacent to site (on right). West and south sides of site are screened from local view by rows of trees and shrubs.

Photo D

Northwest-facing view of Hauoli Hale retirement homes, 150 yards from site. This residential area is not affected by the proposed project due to intervening vegetation.



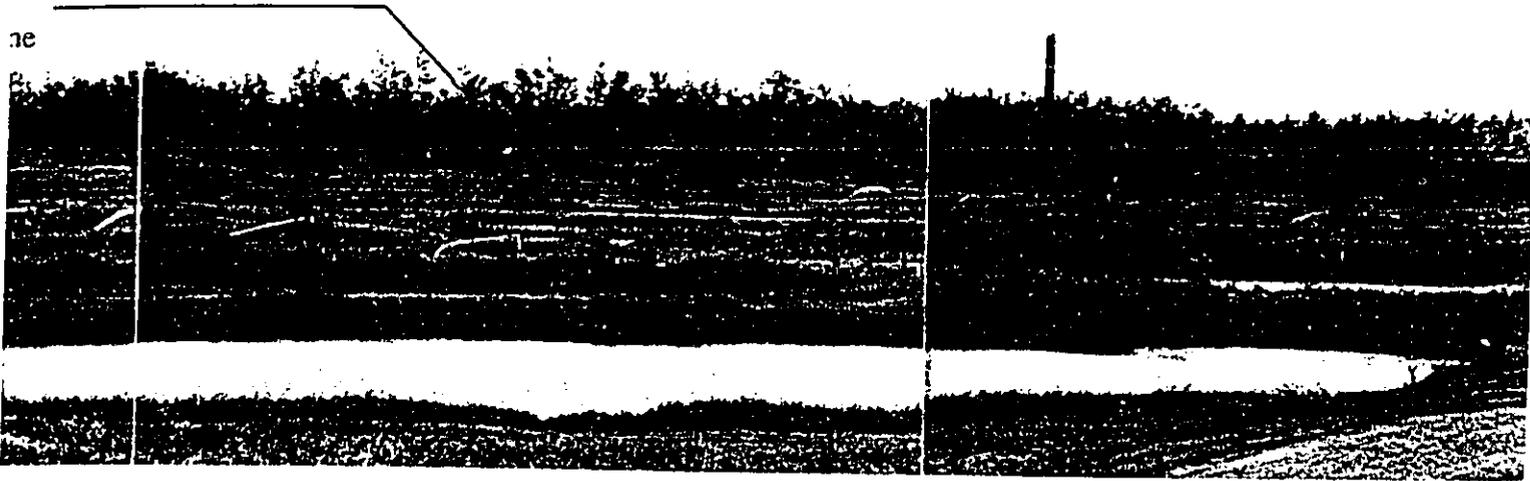
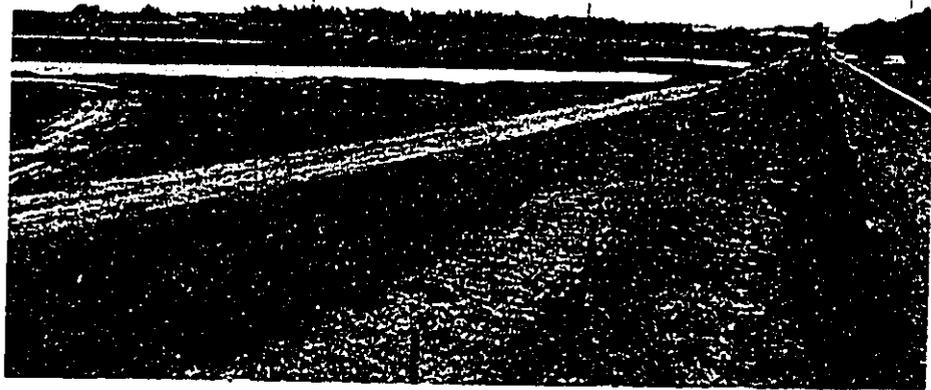


Photo B

Photo A

view from Kamehameha Highway
 agricultural land (resource KL-1,
 dy. Amendment area lies beyond
 sewer treatment plant visible at
 smoke stack at Kahuku sugar



view of project area looking east
 Highway approximately half mile
 ku. Aquaculture ponds are the
 feature within this open space area.



Photo C



Photo D

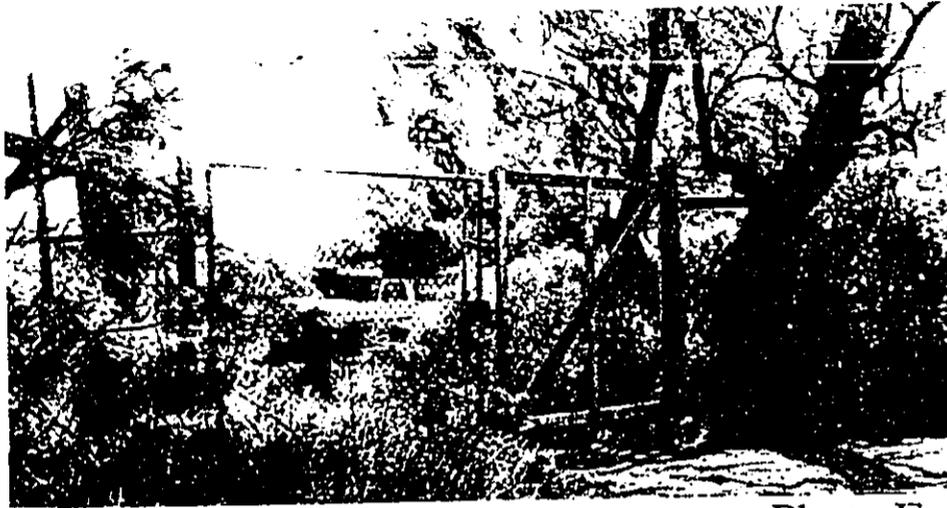


Photo E

Photo E

View into the site from 1st Avenue. Abandoned vehicles and other refuse are scattered around the site.

Photo F

This view of the middle of the site illustrates the results of long-term grazing and abandonment of agriculture.



Photo F

Photo G

Panoramic view from sand dunes overlooking site which lies between piggery in foreground sugar mill smoke stack in background.

Photo H

View of golf course abutting project area.

Photo I

View of golf course abutting project area.

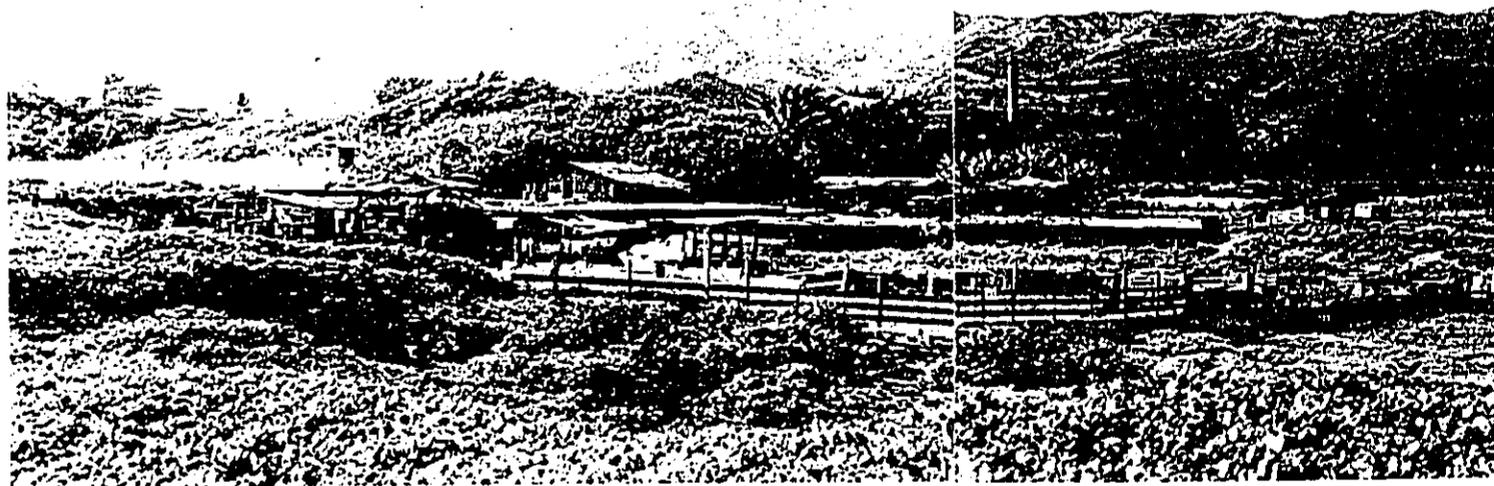


Photo G

...nue. Abandoned vehicles and
...d the site.



Photo H

...e site illustrates the results of
...onment of agriculture.

...nes overlooking site which lies
...l sugar mill smoke stack in

...g project area.



Photo I

...g project area.



Photo G

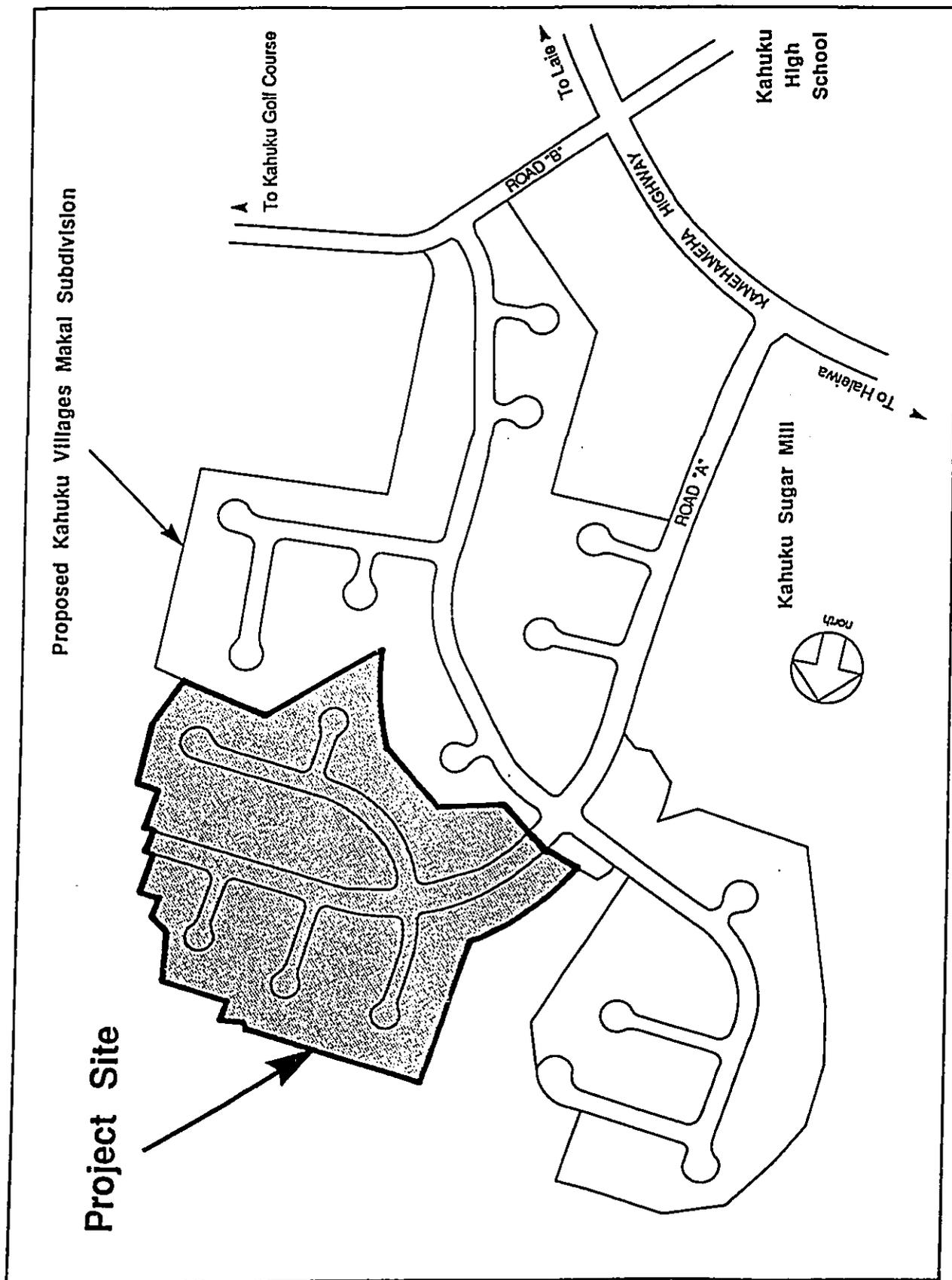
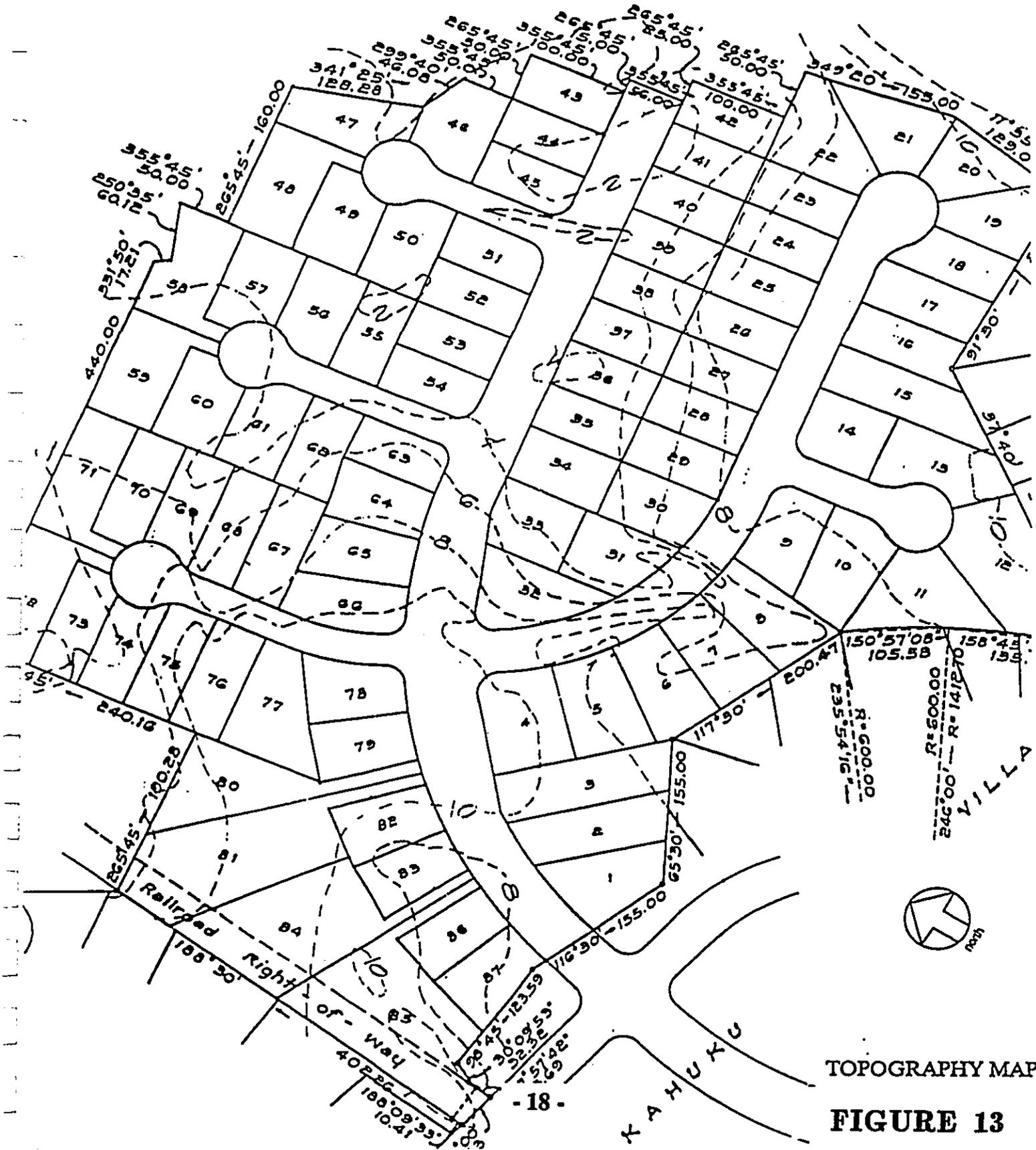


FIGURE 12

PROPOSED KAHUKU RESIDENTIAL



TOPOGRAPHY MAP

FIGURE 13

PROPOSED KAHUKU RESIDENTIAL

III. DEVELOPMENT PROPOSAL

A. APPLICANT'S PROPOSED USE OF THE PROPERTY

The applicant intends to make the site available for residential uses. The proposed development will contain ± 87 single-story, three bedroom, two-bathroom, single-family homes. The housing development is intended to provide area residents an opportunity to purchase a home in the Kahuku community near the major employment center of Turtle Bay Resort.

The Kahuku Village Association has entered into a development agreement with the City and County, Department of Housing and Community Development to develop the existing (Walkerville and Main Camp site) into a residential subdivision for the benefit of fee simple conversion to the residents. The project site borders the south and east edges of this conversion housing area. Construction of the proposed project is intended to complement the surrounding area. Infrastructure and public facility improvements will be consistent with the proposed village rehabilitation project.

B. DEVELOPMENT TIMETABLE

The following is a development timetable which the Applicant believes is achievable but for the most part dependent on actions of government bodies and agencies.

Development Plan Approval:	1990
Land Use Boundary Change to Urban:	1990 (Concurrent Application with Development Amendment)
Zone Change to R-5 Residential:	1991
Shoreline Management Area Permit:	Application for Shoreline Management Permit will be filed following approval of the zone change.
Subdivision of Land:	Application will be filed following approval of the Shoreline Management Permit.
Completion of the Subdivision:	Approximately two years after subdivision approval. Estimate: 1993.

C. APPROXIMATE COST

Plans are conceptual at this time, however, on and off-site costs have been estimated at approximately \$3,141,000. Development costs should be competitive with other developments in the area of a similar type.

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IV. NEED FOR PROPOSED DEVELOPMENT

A. PUBLIC PROBLEMS OR NEEDS

The proposed project is intended to provide fee-simple residential lots and single-family homes in the community of Kahuku. A previous survey of North Shore Realtors indicated a strong demand for residential properties by local residents. The area has been undergoing transition for a number of years — from plantation agriculture to diversified agriculture to resort-related and recreational activities. Long-term economic prospects for the region appear promising as expansion and development proposals continue through review processes. The expansion of the Kuilima resort is likely to lead to an even stronger demand in the Kahuku area for residential homes to accommodate the expected increasing number of employees that will work at the development resort complex.

B. INTENDED MARKET

The project site is intended to serve the residents of Koolauloa/North Shore area. The expansion of the Kuilima resort and other proposed area projects, such as the Kahuku Industrial Park and the development of new recreational facilities proposed for the area (primarily golf courses) are expected to increase employment opportunities in the area. Kahuku, with its available community services, schools, hospital, recreational facilities, and shopping area makes an ideal area for families, particularly, those employed by the developing Kuilima resort and other proposed projects to reside. Adjoining the proposed project is the Kahuku Village Makai Development. This development is a fee simple conversion to the residents of the former Kahuku Plantation camps. Only on availability and qualifying basis are these homes open to the general public.

C. DESIGNATED USE VERSUS PROPOSED USE

The project site is designated agriculture. An Agricultural Impact Study was prepared by Decision Analysts Hawaii, Inc. for the property which is included in this report as *Appendix C*. The findings are summarized below.

Based on a review of the agronomical conditions and the various methods used by governmental agencies in measuring agricultural suitability, the project site was found to have relatively poor soils for crop production. The methods examined included (1) Land Capability Groups, (2) Agricultural Lands of Importance to the State of Hawaii, (3) Overall Productivity Rating, and (4) Proposed Land Evaluation and Site Assessment. See *Section VI, E. 5. g.* for discussion.

Regarding diversified agriculture, the affected lands are poorly suited for crop production as indicated by relatively poor soils, lack of water, exposure to strong winds and salt spray, and proximity to nearby homes. Furthermore, the acreage involved is too small to adversely affect the

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growth of diversified agriculture, particularly in view of the large amount of land that has been released from plantation agriculture and which remains available for diversified agriculture.

Finally, the Kahuku Residential project is consistent with the agricultural portion of the *Hawaii State Plan*, the *State Agriculture Functional Plan*, and the *General Plan of the City and County of Honolulu*. The thrust in all three plans calls for preserving the economic viability of plantation agriculture and promoting the growth of diversified agriculture. To accomplish this, an adequate supply of agriculturally suitable land and water must be assured by protecting high-quality agricultural lands from development. However, marginal or non-essential agricultural lands would be made available for appropriate urban uses. The Kahuku Residential project would not adversely affect the economic viability of plantation agriculture since no plantation lands are involved, and would not adversely affect the growth of diversified agriculture. Furthermore, the lands involved are lower-quality agricultural lands suitable for urban uses.

The most appropriate urban use would be residential. The site is adjacent to the Kahuku Village Makai Development, and would in a small way contribute to the State's pressing need for housing, and in a significant way contribute to the employee housing needs of the area.

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V. STATE AND CITY PLANS/PROGRAMS

This section analyzes the relationship of the project with existing public plans, policies and controls of the State of Hawaii and the City and County of Honolulu.

A. STATE

1. Hawaii State Plan

The Hawaii State Plan (Chapter 226, Hawaii Revised Statutes, as amended) establishes a set of goals, objectives and policies which are to serve as long-range guidelines for the growth and development of the State. The overall theme of the State Plan is: individual and family self-sufficiency; social and economic mobility; and community or social well-being. The proposed project is consistent with the overall intent of the State Plan.

Population: Objectives and Policies

HRS Sec. 226-5(b)(1): Manage population growth statewide in a manner that provides increased opportunities for Hawaii's people to pursue their physical, social and economic aspirations while recognizing the unique needs of each county.

HRS Sec. 226-5(b)(3): Promote increased opportunities for Hawaii's people to pursue their socio-economic aspirations throughout the islands.

HRS Sec. 226-5(b)(7): Plan the development and availability of land and water resources in a coordinated manner so as to provide for the desired levels of growth in each geographic area.

HRS Sec. 226-104(a)(3): Ensure that adequate support services and facilities are provided to accommodate the desired distribution of future growth throughout the state.

Comment

The proposed project will provide approximately 87 new fee-simple single-family homes in the Kahuku community, resulting in some increase in resident population in the area, but also providing opportunities for home ownership in the region and supporting long-term economic development, i.e. the expansion of the Kuilima resort and other new recreational facilities in the area are likely to increase an already strong residential demand by local residents.

The Kahuku community already has a variety of support services and others will be provided through development of the project. The project will also be coordinated with other

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compatible residential developments nearby so that the level of growth can be adequately accommodated.

Economy — General — Objectives and Policies

HRS Sec. 226-6(a)(1): Increased and diversified employment opportunities to achieve full employment, increased income and job choice, and improved living standards for Hawaii's people.

Comment

While the project itself will not result in long-term direct employment opportunities, it would support resort and recreational employment in the region by providing home ownership opportunities to local residents wishing to live and work in the Kahuku community. The availability of new homes in the area would support the sequence of employment activity in the long-term. It would also provide some short-term employment in the construction industry and would add to the tax base when completed.

Economy — Agriculture: Objectives and Policies

HRS Sec. 226-7(a)(1): Continued viability in Hawaii's sugar and pineapple industries.

HRS Sec. 226-7(a)(2): Continued growth and development of diversified agriculture throughout the state.

HRS Sec. 226-7(b)(6): Assure the availability of agriculturally suitable land with adequate water to accommodate present and future needs.

HRS Sec. 226-103(c)(1): Provide adequate agricultural lands to support the economic viability of the sugar and pineapple industries.

HRS Sec. 226-103(d)(1): Identify, conserve and protect agriculture lands of importance and initiate affirmative and comprehensive programs to promote economically productive agricultural uses of such lands.

HRS Sec. 226-104(b)(2): Make available marginal or nonessential agricultural lands for appropriate urban uses while maintaining agricultural lands of importance in the agricultural district.

Comment

The economic viability of the sugar and pineapple industries and the growth of diversified agriculture are the concerns of the

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above objectives and policies. The project involves the redesignation of approximately 13.319 acres of a total 16.3-acre site. An agricultural analysis, prepared by Decision Analysts Hawaii, Inc., suggests the inappropriateness of retaining the site for agricultural uses. The project site is not now used for crop cultivation, but is used for the grazing of horses. Soils on the project site are of a type which severely limit their agricultural use. Other factors which make the project site unsuitable for agriculture include lack of water, exposure to strong winds and salt spray, and proximity to nearby homes.

The project would not adversely affect the economic viability of plantation agriculture, since no plantation lands are involved and the acreage involved is too small to adversely affect the amount of lands available for diversified agriculture. Making low-quality agricultural lands available for urban use is in keeping with the State Plan's overall objectives and policies.

Physical Environment: Policies and Objectives

HRS Sec 226-11(b)(3): Take into account the physical attributes of areas when planning and designing activities and facilities.

HRS Sec. 226-13(b)(6): Encourage design and construction practices that enhance physical qualities of Hawaii's communities.

HRS Sec. 226-13(b)(7): Encourage urban developments in close proximity to existing services and facilities.

HRS Sec. 226-104(b)(1): Encourage urban growth primarily to urban areas where adequate public facilities are already available or can be provided with reasonable public expenditures and away from areas where other important benefits are present, such as protection of valuable agricultural land or preservation of lifestyle.

HRS Sec. 226-104(b)(9): Direct future urban development away from critical environmental areas or impose mitigating measures so that negative impacts on the environment would be minimized.

Comment

The project site borders the proposed Kahuku Village Makai residential development and is therefore in close proximity to public services and facilities. The applicant will contribute to the upgrading of the area's sewage treatment plant; water and wastewater hookups can be connected to existing lines. The site contains no valuable agricultural lands to be protected and is ideally suited for a residential development, since it will complement neighboring residential uses.

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With regard to HRS Sec. 226-104(b)(9), no critical environmental areas would be irretrievably damaged by the project. There are no native or endangered species or habitats and a field inspection failed to produce any surface features of historic significance. Since there is a potential for subsurface deposits of historic interest, the applicant will undertake subsurface testing before developing the site.

Facilities: Objectives and Policies

Sewerage

HRS Sec. 226-15(b)(1): Encourage the adequate development of sewerage facilities that complement planned growth.

Water

HRS Sec. 226-16(b)(1): Coordinate the development of land use activities with existing and potential water supply.

Transportation

HRS Sec. 226-17(b)(2): Coordinate state, county, federal and private transportation activities and programs toward the achievement of statewide objectives.

HRS Sec. 226-17(b)(10): Encourage the design and development of transportation systems sensitive to the needs of affected communities and the quality of Hawaii's natural environment.

Power and Communications

HRS Sec. 226-18(b)(4): Insure that the development or expansion of power systems and sources adequately consider environmental, public health and safety concerns, and resource limitations.

Comment

The project site will be served through the existing public wastewater system. Connection for the project will be at the northeast end of the Kahuku Village Makai development. An internal system of 8" sewer lines will service the area. Coordination will be conducted with the Board of Water Supply and the Kahuku Village Association regarding water allocations. The achievement of statewide transportation objectives will be coordinated with appropriate state and county agencies. On-site transportation systems will include roadways designed to all appropriate standards; vehicular

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access will be from Kamehameha Highway and improvements such as a left-turn storage lane to mitigate traffic impacts of this project and other developments are proposed. Electric and telephone service will be made available to the project area and will be engineered and designed to meet all environmental, public safety and health requirements.

Housing: Policies and Objectives

HRS Sec 226-19(a)(1): Greater opportunities for Hawaii's people to secure reasonably priced, safe sanitary homes located in suitable environments that satisfactorily accommodate the needs and desires of families and individuals.

HRS Sec. 226-19(a) (2): The orderly development of residential areas sensitive to community needs and other land uses.

HRS Sec. 226-19(b)(2): Stimulate and promote feasible approaches that increase housing choices for low-income, moderate-income and gap-group households.

HRS Sec. 226-19(a) (3): Increase home ownership and rental opportunities and choices in terms of quality, location, cost, densities, style, and size of housing.

HRS Sec. 226-19(b)(5): Promote design and location of housing developments taking into account the physical setting, accessibility to public facilities and services, and other concerns of existing communities and surrounding areas.

HRS Sec. 226-19(b)(6): Facilitate the use of available vacant, developable, and underutilized urban lands for housing.

HRS Sec. 226-104(b) (1): Encourage urban growth primarily in existing urban areas where adequate public facilities are already available or can be provided with reasonable public expenditures. Secondly, encourage urban growth away from areas where other benefits are present, such as protection of valuable agricultural land or preservation of lifestyles.

HRS Sec. 226-104(b)(2): Make available marginal or non-essential agricultural lands for appropriate urban uses while maintaining agricultural lands of importance in the agricultural district.

Comment

Demand for fee-simple single-family housing remains high on Oahu, because of shortages in the inventory and unprecedented rises in prices. It is likely that demand in the Kahuku area will increase as employment opportunities become available and

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existing resort facilities are expanded. The project would provide approximately 87 single-story, three bedroom, two bath single-family dwellings. The intended market is the Koolauloa/North Shore area resident. The project would provide additional housing in the area, a percentage of which would serve buyers whose incomes are in the 80 to 120 percent of the median income range. The population increase of approximately 300 persons can be accommodated without serious negative impacts on the agricultural economy and in a manner consistent with the use of adjacent and nearby land uses.

2. State Functional Plans

The Hawaii State Plan directs the appropriate State agencies to prepare functional plans. These plans serve as the primary implementing vehicle for the goals, objectives and policies of the Hawaii State Plan. A discussion of the applicable functional plans affected by the proposed project follows:

Agriculture

The Agriculture Functional Plan focus is to carry out objectives and policies for agriculture which center on the (1) continued viability in Hawaii's sugar and pineapple industries, and (2) continued growth and development of diversified agriculture throughout the State.

The project would result in the urbanization of approximately 13.3 acres which are contiguous to lands already designated and zoned for residential use. The project site contains lands of marginal suitability for agricultural uses and which are now used for grazing, but no crop cultivation. Removal of the lands from agricultural uses is not expected to adversely affect diversified agriculture or the sugar and pineapple industries.

Health

The Health Functional Plan focuses essentially on public health programs under the jurisdiction of the State Health Department. Health and medical care facilities are located in the immediate region of the project site and are expected to accommodate the additional population of the project.

Other issues of concern to the Department have been addressed in the sections of this document relating to air quality, noise impacts, and the adequacy of public facilities and services. Where adverse impacts have been identified, appropriate mitigative measures have been proposed.

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Housing

The objectives of the Housing Functional Plan deal primarily with the orderly development of housing and expanded opportunities for Hawaii's people to secure adequate and affordable housing.

The project would fill an increasing need for residential fee-simple homes in the Kahuku community. Housing for persons employed in the expanded resort and future recreational uses would provide opportunities for residents to live and work in the area and therefore fulfill a number of statewide housing, transportation and economic objectives.

Historic Preservation

The Historic Preservation Functional Plan focuses on preparing an archaeological survey, preserving sites considered of value, and coordination of salvaging and preservation with the Historic Sites Office. An archaeological survey of the project site revealed no surface features of historic significance. A subsurface test will be made before development takes place.

Recreation

The Recreation Functional Plan focuses on meeting existing and future recreational demands. The project will comply with the Park Dedication requirements.

Transportation

The Transportation Functional Plan provides for an efficient, safe and convenient movement of people and goods, and calls for a statewide transportation system supportive of planned growth objectives throughout the State.

A traffic impact assessment has been done and improvements for vehicular access to the project site from Kamehameha Highway are proposed. The improvements are expected to not only mitigate impacts from this project, but to benefit other developments in the area as well.

Water Resources

This Functional Plan's objectives generally are the development and regulation of water resources to meet different land uses, as well as the preservation of water-related ecological, recreational, and aesthetic values and the quality of water resources.

There will be coordination with the Board of Water Supply and the Kahuku Village Association regarding water allocations.

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B. CITY

1. City General Plan

Population

Objective C., Policy 3: Manage physical growth and development in the urban-fringe and rural areas so that: (a) an undesirable spreading of development is prevented; and (b) their population densities are consistent with the character of development and environmental qualities desired for such areas.

Comment

It is estimated that the resident population of Koolauloa would increase by approximately 300 persons as a result of the project. Although this would appear to exceed the current General Plan population guidelines for Koolauloa, adopted in January of 1989, the increase is considered insignificant in view of the Department of General Planning's estimates of housing capacity in the Koolauloa District for the year 2010, which would result in a population of 16,400, or an increase of 2,400 above the population guidelines. In addition, the character of development in the Kahuku community is undergoing change, resulting in a demand for residential development to provide housing near new employment centers. The estimated increase is thus considered consistent with the character of development in the area and will not adversely affect existing environmental qualities.

Economic Activity

Objective A., Policy 1: To promote employment opportunities that will enable all the people of Oahu to attain a decent standard of living by encouraging the growth and diversification of Oahu's economic base.

Comment

The project would result in some short-term employment during construction. In addition, it would support the region's growing economic base by providing home ownership opportunities in proximity to employment bases such as the Kuilima Resort and sites proposed for industrial and recreational developments. Real property taxes are expected to increase as the land is developed to higher use.

Natural Environment

Objective B., Policy 2: To preserve and enhance the natural monuments and scenic views of Oahu for the benefit of both

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residents and visitors by protecting Oahu's scenic views, especially those seen from highly developed and heavily traveled areas.

Comment

The project site, which is on the makai side of Kamehameha Highway is level, with no significant topographic features. The only potential view of the site is from the Highway; however, the site is screened by trees and existing homes. The site is open to view on the north side, where it is contiguous to agricultural open space. There is no roadway or other public usage either north or west of the site. No scenic views would be adversely affected by residential development of the site.

Housing

Objective A., Policies 1, 3, and 10: To provide decent housing for all the people of Oahu at prices they can afford by: (a) developing programs and controls which will provide decent homes at the least possible cost; (b) encouraging innovative residential development which will result in lower costs, added convenience and privacy, and the more efficient use of streets and utilities; and (c) promoting the construction of affordable dwellings which take advantage of Oahu's year-round moderate climate.

Objective C., Policies 1, 3, and 5: To provide the people of Oahu with a choice of living environments which are reasonably close to employment, recreation, and commercial centers and which are adequately served by public utilities by: (a) encouraging residential developments that offer a variety of homes to people of different income levels and to families of various sizes; (b) encouraging residential developments near employment centers; and (c) discouraging residential development where, roads, utilities and community facilities cannot be provided at a reasonable cost.

Comment

The project will provide new homes for the residents of the Kahuku community. Design and siting of structures, layout of infrastructure, and visual impact will complement the surrounding area and adjacent residential developments. Houses will be marketed at affordable prices to area residents.

The project would support adjacent residential developments and other resort/recreational projects in the region. It is anticipated that new employment opportunities will create an even stronger demand for residential units in the Kahuku area and the project would help fulfill this need. A variety of community services and public facilities are already available to

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accommodate residential development and others would be added as a result of this project.

Transportation and Utilities

Objective A., Policies 9 and 10: To create a transportation system which will enable people and goods to move safely, efficiently, and at a reasonable cost; serve all people, including the poor, the elderly, and the physically handicapped; and offer a variety of attractive and convenient modes of travel by: (a) promoting programs to reduce dependency on the use of automobiles; and (b) by discouraging the inefficient use of private automobiles, especially in congested corridors and during peak hours.

Objective C., Policy 2: To maintain a high level of service for all utilities and provide improvements to utilities in existing neighborhoods to reduce substandard conditions.

Comment

Since the intended market is persons employed in the Koolauloa/North Shore region, it is expected that some overall transportation objectives will be realized by the provision of housing in close proximity to employment. Accordingly to the traffic impact analysis, the project will not significantly affect the traffic flow on Kamehameha Highway in 1993 when completion is expected. Access improvements from the Highway to the project site are also proposed.

A number of improvements are proposed to accommodate the project and service other developments in the area, such as expansion of the Kahuku Wastewater Treatment Plant and the above roadway improvements.

Physical Development and Urban Design

Objective A., Policy 4: To coordinate changes in the physical environment of Oahu to ensure that all new developments are timely, well-designed, and appropriate for the areas in which they will be located by requiring new developments to provide or pay the cost of all essential community services, including roads, utilities, schools, parks, and emergency facilities that are intended to directly serve the development.

Comment

The project is timely, intended to provide home ownership opportunities to residents of Kahuku, and will be designed to complement existing residential uses in the area. A variety of essential services are already available in the community, including schools, medical services, recreational facilities and a

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shopping area. The applicant will participate in the expansion of the Kahuku Wastewater Treatment Plant to accommodate this and other developments in the area. All other services needed, including road improvements and utilities will be provided to meet governmental requirements.

Culture and Recreation

Objective D., Policies 9 and 10: To provide a wide range of recreational facilities and services that are readily available to all residents of Oahu by (a) requiring all new developments to provide their residents with adequate recreation space; and (b) encouraging the private provision of recreation and leisure-time facilities and services.

Comment

Applicant will comply with the requirements of the Park Dedication Ordinance.

2. Development Plan for Koolauloa

Approximately 13.3 acres of the project site are designated Agriculture on the Koolauloa Development Plan and zoned AG-2 General Agricultural. Project development will require redesignation to Residential and a zone change to R-5 Residential District.

Common Provisions: Section 4. General Urban Design Principles and Controls

This section of the Development Plan Ordinance discusses the importance of Public Views, the provisions for Open Space, and the need for Landscaping.

Comment

The project is consistent with the General Urban Design Principles and Controls. Because the site is substantially screened from Kamehameha Highway views by existing vegetation, homes and by distance, it will have no significant negative effects on public views. Public views, open space and the rural character of the region will not be significantly impacted.

Special Provisions: Section 2, Urban Design Principles and Controls

This section addresses specific urban design considerations for the Koolauloa District. These include open space, public views and density controls with emphasis on special characteristics of the District.

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Comment

The project would not impact negatively on any of the special open spaces identified in the Koolauloa District Development Plan, nor would it adversely affect any public scenic views. Height and density controls will be consistent with those specified for the District and the development will be compatible with existing and proposed single-family residential developments.

Zoning and Subdivision

The existing zoning is AG-2 General Agriculture District. The proposed zoning is R-5 Residential District, which is the same as adjacent residentially-zoned lands. This zoning district is also compatible with the proposal to amend the Koolauloa District Development Plan. Application for a zone change to R-5 will be filed with the Department of Land Utilization on approval of the Development Plan amendment proposal.

The design of the subdivision will be consistent with the standards developed for the adjacent residential development. Grading will meet the requirements of the Department of Public Works. In addition, Park Dedication requirements will be met.

3. Special Management Area (SMA)

The project site is within the SMA and will require a permit. The project is not expected to conflict with any major shoreline protection objectives, since no public views or access to the shoreline area are affected, and no historic, cultural, or archaeological resources are affected. Flood studies and drainage reports will be prepared and coordinated with the U.S. Fish and Wildlife and other appropriate government agencies during the filing of the SMA permit application.

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VI. IMPACTS

A. DEMOGRAPHIC IMPACTS

1. Residential Population

The residential population of Koolauloa would increase by approximately 300 people. Although this increase appears to exceed the General Plan population guidelines for Koolauloa, it should be noted that proposed developments for the area, particularly the Kuilima Resort expansion, will create a demand for housing by persons employed in newly created positions. In light of efforts to bring employment and new industry into an area, heretofore, largely dominated by plantation agriculture the proposal warrants consideration. See *Section V.C.I.* for further discussion.

2. Visitor Population

N/A

3. Character or Culture of the Neighborhood.

The character of the surrounding area is residential and commercial, and agricultural in nature. The proposed development is intended to complement and the adjacent proposed development of the Kahuku Village Makai Subdivision.

4. Displacement

The site is occasionally used for grazing. Abandoned farm structures remain on the property. Ample lands are available for small-scale grazing activities. No impact is anticipated.

5. Other Social Impacts

N/A

B. ECONOMIC IMPACTS

1. Economic Growth

Development of the project will result in short term jobs in the construction industry during development.

2. Employment

Development of the project will result in construction industry jobs. In addition, it is expected that individuals seeking positions at the expanding Kuilima Resort complex would be attracted to the prospect of fee-simple home ownership. The availability of new

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homes in the area would support the sequence of growing employment activity.

3. Government Revenues (Taxes)

Real property taxes can be expected to increase as the land is developed to a higher use.

4. Location vis-a-vis Intended Market

The proposed site is located close to the Kuilima Resort complex as well as to sites being proposed for industrial and recreational developments. According to a previous study (Zapotocky, 1988), as many as 600 additional dwellings are needed in the Kahuku area (Census Tract 101).

C. HOUSING IMPACTS

1. Increase Supply

The addition of an estimated 87 single-family homes will increase the supply of available fee-simple homes in the Koolauloa area.

The project would complement and support neighboring residential developments and other proposed non-residential regional projects. Community services and public facilities are available. Water and wastewater hookups can be connected to existing lines. The applicant is willing to contribute to the upgrading of the area's sewage treatment plant (STP). The area would be well served by the existence of the project development.

2. Affordable Units

The units are not intended for speculative purposes, but rather to meet area demands for housing due to increased economic activity in the area. Houses will be marketed at prices affordable to area residents. Exact unit prices have not been determined at this stage of planning. Units prices, however, will be better defined as the project proceeds through the legislative process.

D. PUBLIC SERVICES

1. Access and Transportation

Pacific Planning and Engineering, Inc. (PPE) has undertaken a study to identify and assess future traffic impacts of the proposed Kahuku Residential development project. See *Appendix D*.

The study focuses on the intersections of Kamehameha Highway and Road "A" and Road "B" (see *Figure 13*) which provide access to the

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project from all directions. The traffic impact report identifies and evaluates the probable impact of project generated traffic by comparing traffic conditions with and without the project traffic. The report assesses traffic impacts during the weekday and weekend afternoon peak hours.

The primary access to the project will be Road "A" which connects the project to Kamehameha Highway. Road "B" also provides an alternate access to the project. Construction for the proposed project is expected to be complete in 1992 with full occupancy by 1993. The market for the development is expected to be primarily local residents.

Vehicular access to the proposed development will be from Kamehameha Highway which is the only highway in the area providing for through traffic along the North Shore of Oahu. It is a State maintained highway with a 50 foot right of way and a 20 foot wide pavement in the vicinity of the project. There is a 10 foot wide lane in each direction. The posted speed of Kamehameha Highway in the project vicinity is 35 miles per hour.

Road "A" is a private road with a pavement width of 20 feet. It provides access to the Kahuku Sugar Mill and residences. The intersection of Kamehameha Highway with Road "A" is a "T" intersection. Road "B" is a private road with a pavement width of 20 feet. It provides access to the Kahuku Golf Course and residences, and will provide a secondary access to the project site through the residential area. The intersection of Kamehameha Highway with Road "B" forms a cross-intersection with Kahuku High School driveway as the fourth leg.

Future land uses in the immediate area that would affect future traffic conditions were identified. Among the major planned developments that have been approved are the Turtle Bay Resort and the Kahuku Village Makai Subdivision. By the year 1993, the resort is planning to build 1000 additional hotel units, 20,000 square feet of gross leasable commercial area and an 18-hole golf course. The proposed Kahuku Village makai Subdivision is expected to consist of 177 single-family dwelling units and to be fully occupied by 1993.

The proposed Kahuku Residential Subdivision will not significantly impact the traffic flow on Kamehameha Highway in 1993 when the project is expected to be completed.

The results of the analysis show that the project will cause little or no delay (LOS A) to traffic along Kamehameha Highway during the weekday and weekend afternoon peak hours. The left turn traffic into Road "A" and Road "B" from Kamehameha Highway will remain at LOS A with or without the project traffic.

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By 1993 even without the project, the LOS for vehicles attempting to exit Road "A" and "B" onto Kamehameha Highway will operate with long delays during the weekday and weekend afternoon peak hours. Vehicles exiting Road "A" and Road "B" will operate at LOS E and DOS D, respectively. This increased delay is due in part to an increase in traffic along Kamehameha Highway as well as traffic generated from the proposed Kahuku Village Makai Subdivision. The traffic generated by the Kahuku Villages Makai Subdivision will make up about 42% (104 vehicles) of the total traffic along Road "A" and 45% (70 vehicles) of the total traffic along Road "B." In comparison, the traffic generated by the proposed project makes up about 35% (87 vehicles) of the total traffic along Road "A" and 6% (9 vehicles) of the total traffic along Road "B."

With the project, the LOS for the vehicles attempting to exit Road "A" onto Kamehameha Highway will worsen, unless corrective action is taken (see below). The LOS for vehicles exiting Road "A" will drop from LOS E to LOS F during the weekend, but remain at LOS E during the weekday. The LOS for vehicles exiting Road "B" will remain at LOS D for weekday and weekend afternoon peak hours. The delays for drivers exiting Road "A" and "B" are expected only during the peak hours.

To minimize the impact of the project and other developments in the area, it is recommended that an exclusive left-turn lane be provided at the makai approach to intersection of Kamehameha Highway with Road "A". This intersection will permit drivers attempting right turns to bypass the left turning vehicles and decrease delays for vehicles attempting right turns.

Also, a left-turn storage lane should be provided along Kamehameha Highway for vehicles turning left onto Road "A." The results of the warrant analysis indicate that this improvement is warranted even without the project. The storage lane will minimize delays for Laie-bound vehicles on Kamehameha Highway. Other developments such as the proposed Kahuku Village Makai Subdivision will generate a substantial amount of traffic along Roads "A" and "B" (see above) that will also benefit from the left-turn storage lane.

2. Water

On Site: The project will connect to an existing 8" domestic water line at the northeast end of the Kahuku Village Makai Development. The internal system will consist of 8", 6", and 4" water lines. Fire protection will be constructed in accordance with the requirements of the Board of Water Supply and Fire Department.

Off-Site: Since 1979, Kahuku has been served by the Board of Water Supply's 0.5 million gallon reservoir. Presently this system serves all existing improvements. The Kahuku Village at that time was served by a master meter with distribution via the old plantation system.

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During the early stages of the Kahuku Village Redevelopment, the Board of Water Supply granted the Kahuku Housing Corporation water to supply 410 residential units. Any new developments would require new storage and possibly well facilities, as the Kahuku Housing Corporation's allotment would deplete the existing capacity. That project has been scaled back to 287 units, however, and water has been released by the Kahuku Village Association to other projects. There may be adequate capacity for an additional 100 units. Coordination will be conducted with the Board of Water Supply and the Kahuku Village Association regarding water allocations.

In 1982, the sustainable yield for the Kahuku Aquifer Subarea was reported to be 15 million gallons per day. Daily consumption was estimated to be about 8.2 million gallons per day. Since that time, no new facilities have been constructed in the area, and, therefore, no additional demands should have been made against the ground water resources. If new sources and facilities are necessary to serve the project's needs (43,500 gpd), they will be developed near the existing source, mauka of the Highway and existing housing, on Campbell's land.

3. Wastewater

On-Site: The development will be served through the existing public wastewater system. Connection for the project will be at the northeast end of the Kahuku Village Makai Development. An internal system of 8" sewer lines will service the area.

Off-Site: Off-site flows will be directed to the Kahuku Wastewater Treatment Plant, which has a present capacity of 200,000 gpd. This plant will have undergone a 100 percent expansion by the time this project gets underway. The \$3 million dollar expansion cost is being funded by the City and County of Honolulu, State of Hawaii, Kahuku Village Association and the Estate of James Campbell. Campbell Estate's share of \$1,084,517 was made with the understanding that the needs of this project (34,800 gpd) and others will be accommodated.

4. Drainage/Grading

Under the drainage considerations for the Kahuku Village Makai Development, two retention ponds were to be created within the project area. These ponds were to be at an elevation of 0 with an overflow to match the existing ground.

Because of the proposed project, the drainage system intended for Kahuku Village Makai Development will have to be redesigned and integrated with the proposed development. Ponds would be relocated (see *Figure 9*) west of the project site to accommodate the proposed development, as well as the adjacent development. Design of the off-site retention system will be prepared in close coordination with the US Fish and Wildlife Service to prevent adverse downstream

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environmental effects to the James Campbell National Wildlife Refuge located within Kii Pond to the north. No increase in run-off to the refuge area will occur as a result of the development.

Grading of the project area will be mainly limited to embankment material. Three factors will control the extent of the grading.

- a. The adjacent grades of the Kahuku Village Makai Development.
- b. The FIRM flood depths and elevations.
- c. The depth of the existing sewer line of the Kahuku Village Makai Development.

The sewer will control the vertical limits of the grading. The invert of the existing sewer manhole will be close to elevation 0.0. Even at the minimum allowable slope and minimum cover, the low lying areas will require six to seven feet of fill. A similar land fill permit has been approved for the adjacent Kahuku Village Makai Development.

All appropriate drainage reports will be filed and permits will be applied for with the appropriate agencies.

5. Solid Waste

City and County solid waste pickup is available for the area. Private disposal companies are also available. There are no private or public dump sites in the Koolauloa area. The closest landfill is in Haleiwa and Kapaa on the windward side of Oahu. The development, once occupied, is expected to generate approximately six tons of solid waste per week.

6. Utilities

Electric and telephone service will be made available to the project area via the Kahuku Makai Development. Consistent with the Kahuku Makai Development, the services will be by an overhead system. All necessary permits and waivers will be applied for with the appropriate government agencies.

7. Schools

Kahuku Intermediate and High School presently accommodates grades 7 through 12. Kindergarten classes are being held at the High School. Completion of new Kindergarten classrooms at the Elementary School is expected by the next school year, thus providing additional classrooms for intermediate and high school instruction. According to the school's Registrar current enrollment is approximately 1600. They expect the next two years to serve an additional 400 students. The Kahuku Elementary School also is in

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the process of adding classrooms. Further, classroom expansion may be necessary to accommodate students from the proposed project.

8. Parks

The Park Dedication Ordinance requires a developer to dedicate sufficient land or pay a fee in lieu of land in order to meet the recreational needs of the project's residents. The minimum standards require a dedication of 350 square feet of park per residential unit (87 X 350 sq.ft. = 30,450 sq.ft.). These provisions are implemented through the subdivision process.

A 15-acre District Park exist in the area. Seven and one-half acres this park is owned by Campbell Estate and leased to the City for one (1) dollar per year. The approximate one-acre of land required to meet the requirements of the Park Dedication Ordinance for this project could be achieved by readjusting the area leased by the City.

Acceptance of land by the City commits public funds for site improvements and maintenance.

9. Police

Construction activities may cause a temporary need for increased police services due to potential for construction related disruption of traffic. Over the long term, routine patrols of the area as well as normal police services, will have to be provided to residents who purchase homes in the development. Police services are provided by the Kahuku Police Substation. The Police Department currently has long range plans to establish this as a main station, although implementation will be determined by funding.

10. Fire

Fire protection for the proposed site is available from the Kahuku fire station with backup from the Sunset Beach Fire Station. There are plans for a Kawela Bay Station to be developed in order to provide more service to the area, particularly for the developing Kuilima Resort complex.

11. Education and Day Care

The proposed project will increase the number of families living in the area; therefore the need for child care services may increase.

12. Medical and Emergency Services

The Kahuku Hospital is a 26-bed facility which provides ambulance service and a helipad for medical evacuation by helicopter. The facility is located across Kamehameha Highway on the mauka side of the roadway. The hospital offers 24-hour medical office/clinic with five physicians in private practice available at the facility. Increased

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demand for services may be generated by the project. The comprehensive-service facility should be well equipped to accommodate emergencies or other medical needs that could result from the residential development.

13. List of Agencies Consulted

Department of Education

Department of Housing and Community Development

Department of General Planning

E. ENVIRONMENTAL IMPACTS

1. Noise

Noise generated from the proposed project will occur as a result of construction activities associated with site preparation.

No adverse noise impact is expected in the long term.

2. Air Quality

An Air Quality Impact Study was conducted by James Morrow, Environmental Management Consultant in December 1989. The report studied the existing air quality and addressed direct and indirect impacts:

- Mobile Source Impact
- Electrical Generation Impact
- Refuse Disposal Impact
- Construction Impact

The Report is included as *Appendix A* in this application, and is summarized below. Note: Figures and tables referred to can be found in the *Appendix*.

a. Existing Air Quality

While there is no air monitoring station in the project area, it is assumed that air quality is in compliance with state and federal standards. (*Table 1*). There are no large stationary sources in the immediate vicinity, and the principal indirect source, Kamehameha Highway, does not yet have the traffic volume to cause excessive pollutant levels. The nearest State Department of Health monitoring station on windward side of Oahu is at Waimanalo approximately 28 miles southeast of Kahuku. Total suspended particulate matter (TSP) measurements at that site during 1988 indicated levels ranging 16-82 micrograms per

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cubic meter (mg/m³) and an annual mean of 29 ug/m³, all of which were in compliance with state standards. No other pollutant monitoring is conducted in windward Oahu by the state.

Air sampling conducted in conjunction with this project found 1-hour carbon monoxide (CO) levels in 3 - 4 milligrams per cubic meter (mg/m³) range along the highway during the p.m. peak hour under light wind conditions (see *Figure 1*). This was consistent with computer predicted CO levels (*Figure 2*) and below the state standard of 10 mg/m³. CO levels also drop off with distance from the roadway.

b. Impacts/Mitigative Measures

Short-Term: During the construction phase, there will be short-term air quality impact associated with site preparation (fugitive dust and movement of construction vehicles (exhaust gases and particulates). Heavy construction vehicle traffic on nearby roadways can also reduce roadway capacity, resulting in lower average travel speeds contributing to additional air pollution emissions.

Fugitive dust can be mitigated by frequent watering of exposed soil areas and the soonest possible landscaping and roadway paving to minimize the length of time of soil exposure. EPA estimates that 50% reduction in fugitive emissions can be accomplished by twice daily watering. Construction vehicle exhausts are primarily controlled by proper maintenance of vehicle engines to insure efficient operation. The impact on Kamehameha Highway can be reduced by minimizing construction vehicle movement during peak traffic hours.

Offsite short-term impacts associated with construction include the operation of asphalt concrete and concrete batch plants to provide the material for road building and foundations. Those plants will emit pollutants while they are producing product for the proposed project. Such plants must have Department of Health permits to operate and must have demonstrated their ability to meet federal and state air quality standards in order to receive those permits; thus, the production of materials for the Kahuku Residential project can be considered as part of their normal operation and thus in compliance with air pollution control rules.

Long-Term: Due to its distance from the highway and *upwind* location in relation to prevailing northeasterly winds, the project site itself should be minimally impacted by Kamehameha Highway traffic. The primary long-term impact of the project will be associated with the motor vehicle traffic generated by it. An air quality impact analysis based on cumulative traffic volumes indicated that while there will be

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slight increase in carbon monoxide levels along Kamehameha Highway intersection, those levels will be in compliance with the most stringent applicable standards, for example, State of Hawaii. In fact, the predicted 1-hour CO concentrations were lower than both the 1-hour and 8-hour standards, thus indicating compliance with even the more stringent 8-hour standards.

Electrical generation required to support the project will also result in offsite emissions at a power plant, most likely the Kahe Point Power Station. Estimates of annual emissions resulting from the approximately 0.6 million kilowatt hours needed by the project amounted to less than 0.1% of total county emissions. Use of solar water heating, heat pumps, waste heat recovery, other energy efficient devices, etc. can help reduce the electrical energy demand and thus the emissions.

Similarly, the solid waste generated by eventual project residents will most likely be burned at the City's resource recovery facility at Campbell Industrial Park resulting in additional emissions at that site. Estimates of these emissions indicated quantities less than 0.1% of county emissions. Progress towards government requirements for recycling and source separation will eventually lead to less combustion of wastes thus further reducing the already small impact of the project.

3. Compatibility with Surrounding Environment See Appendix G

A Visual Impact Assessment was prepared by Michael S. Chu, Land Architect, in order to assess the following (photographs are included as Figures 10 and 11 — see Gray Section):

- Existing visual conditions;
- Probable visual conditions after construction and landscaping of recently approved adjacent projects, and,
- Current State and City/County development plans and policies relating to visual quality.

a. Existing Conditions

Due to the project's early stage of processing, final plans for the project's visual appearance (grading and vegetation removal, dwelling heights, bulk, color, and roof style, street landscaping, etc.) have not been prepared. Maps are preliminary and schematic in design.

The 16.3 acre site, which stretches on the makai side of Kamehameha Highway is level and contains no significant topographic features, prominent tree masses or other stands of vegetation. The site is surrounded on its west and south sides

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by land destined for residential development of the Kahuku Village Makai Subdivision. The northwest end of the Kahuku County Golf Course lies along the east side of the site, while the north side is adjacent to open agricultural land. The National Wildlife Refuge (Kii Unit) is located nearby on this open agricultural plain approximately one-third mile northwest of the site. The site is one-fourth mile from the shoreline and is not visible from the shoreline area.

The only potential view of the site from public roadways is from Kamehameha Highway west of Kahuku. The project area, however, is substantially screened from view by several rows of Ironwood trees, other shrub masses (Koa-haole, castor bean, banana, and papaya) and plantation homes. Similar vegetative screening occurs along the west, east, and southern edges of the site. On the north side, the site is completely open to view, and is continuous with adjacent agricultural open space. This exposure is of no consequence, however, since there is no roadway or other public usage in the open space area north and west of the site.

The proposed project will consist of approximately 87 residential lots on a 16.3 acre site. Site improvements will be similar to those developed for the Kahuku Village Makai Subdivision, with on-site drainage, sewer and domestic water systems being provided.

A railroad right-of-way, in favor of the Estate of James Campbell, will be maintained along the southwest edge of the site.

b. Impacts/Mitigative Measures

Short-Term Visual Impacts

There would be a locally significant visual disruption during project clearing, grading and construction, due to vegetation removal, stockpiling of materials and occasional dust. The extent of human exposure to such visual disruption would be relatively low, being limited to adjacent residents within the Kahuku Village Subdivision, golfers and occasional beach-goers at the northwest end of the golf course.

The magnitude of this impact is attenuated by the existing low visual quality of the site. Adherence to the County's *Soil Erosion Standards and Guidelines* (Department of Public Works, 1975) and other standard construction impact control (dust control, temporary vegetation, erosion controls, construction timing, etc.) will keep such unavoidable visual impacts within acceptable limits.

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Long-Term Visual Impacts

The visual impact of greatest concern is the project's potential effect on open space views across the agricultural fields as seen from the coastal highway. Because the site is substantially screened from the highway views by existing vegetation and by distance, the proposed project will have no significant visual impact on existing open space and highway views. The existing sewage treatment plant building (see *Photo A*) will continue to be the only intrusion into this portion of the area's agricultural open space.

Existing Ironwood trees should be maintained for visual screening and landscape purposes. No additional mitigations are needed. The Koolauloa DP residential height limit of 25 feet ensures that the project structures will be much below the existing vegetation screens between the site and Kamehameha Highway.

The site is visually isolated and contains no significant natural land forms or scenic resources and does not conflict with existing State and City/County policies and objectives regarding public views or scenic resources. Public views, open space and the rural character of the region will not be significantly affected or impacted, nor will the proposed project affect existing public access to the shoreline area. No additional mitigations are needed.

4. **Historic and Archaeological Resources** *See Appendix F*

An Archaeological Reconnaissance Survey (Archaeological Consultants of Hawaii, November 1989) of the project site was conducted. The field inspection failed to produce any surface features of historic significance. Raised mounds and platforms within the flat area were judged most likely to be piles of dirt and rubble pushed up during clearing operations. Based on the site location with respect to the Kahuku sand dunes and the deep nature of the soil conditions, there is a potential for subsurface deposits that may have historic importance. As a mitigative measure, the applicant will undertake a subsurface testing program prior to any development taking place on the site.

5. **Natural Features**

a. **Water Resources**

The project will connect to an existing 8" domestic water line at the northeast end of the Kahuku Village Makai Development. The internal system will consist of 8", 6", and 4" water lines. Fire protection will be constructed in accordance with the requirements of the Board of Water Supply and Fire

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Department. Coordination will be conducted with the Board of Water Supply and the Kahuku Village Association regarding water allocations.

b. **Flood Zones**
(See *Figure 8*)

According to the FIRM maps for Oahu, the site falls within the AO and AE zones. Both zones are subject to the Land Use Ordinance relating to Flood Hazard Districts. Land fill similar to the levels approved for the adjacent Kahuku Village Makai Subdivision will be considered. See *Section 4.D., Drainage/Grading* for further discussion.

Flood studies and drainage reports will be prepared and coordinated with appropriate agencies during the filing of applications for a Shoreline Management Permit and Subdivision.

c. **Wetland Protection**

A drainage system will be designed in consultation with the U.S. Fish and Wildlife to prevent any increased flows into the James Campbell National Wildlife Refuge. The specifics of the drainage system will be developed in conjunction with applications for a Shoreline Management Permit, Zone Change, and Subdivision.

d. **Coastal Zone Management**

The site is within the Special Management Area (SMA). All environmental issues will be addresses during the Shoreline Management Area Permit application process, especially any drainage impacts on the Refuge Area.

The proposed project does not adversely impact any of the Coastal Zone management (CZM) program objectives and policies.

e. **Unique Natural Features**

The site is essentially flat with sand and clay as the basic soil types. However, based on the site location with respect to the Kahuku sand dunes and the deep nature of the soil conditions, there is a potential for subsurface deposits that may have historic importance. The Applicant will undertake a subsurface testing program prior to any development taking place on the site.

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f. Vegetation and Animal Life

Botanical — See Appendix B

A botanical survey was made of the proposed Kahuku Residential project site (Char and Associates, November 1989). The primary objectives of the field survey were to

- (1) Provide a general description of the vegetation type.
- (2) Inventory the flora.
- (3) Search for rare, threatened and endangered species.

Species recorded from the site in this survey reflect both the season of the field study and the overall environmental conditions. Surveys taken at different seasons of the year ("rainy" vs "dry") would no doubt yield slightly different species composition, especially among the weedy annuals.

The majority of the ±16.3-acre parcel is presently used for grazing cattle and horses. California grass (*Brachiaria mutica*), 1 to 3 feet high, comprises the main foliage along with scattered shrubs of Koa-haole (*Leucaena leucocephala*). Weedy India pluchea (*Pluchea indica*) shrubs, 3 to 5 feet high, are also a common component of the pastureland. In general, the densely matted California grass tends to exclude many other species. Some other plants found in smaller numbers include Bermuda grass (*Cynodon dactylon*), Swollen finger grass (*Mimosa pudica* var. *unijuga*), 'uhaloa (*Waltheria indica*), False mallow (*Malvastrum coromandelianum*), and Crabgrass (*Digitaria ciliaris*).

Where the property adjoins Kahuku Village Makai, there is a line of trees along its perimeter. Trees here include Ironwood (*Casuarina equisetifolia*), Hau (*Hibiscus tiliaceus*), False kamani (*Terminalia Catappa*), Kiawe (*Prosopis pallida*), and Sea grape (*Coccoloba uvifera*). Weedy species also occur in greater abundance along the periphery of the property as there is less grazing pressure and also less competition from the mats of California grass. Some plants found here include New Zealand spinach (*Tetragonia tetragonioides*), Popolo (*Solanum americanum*), Chinese violet (*Asystasia gangetica*), 'aheahea (*Chenopodium murale*), Spiny amaranth (*Amaranthus spinosus*), and Hairy spurge (*Chamaesyce hirta*).

A total of 51 plant species were inventoried on the site during the field studies. Of these 45 (88%) are introduced or alien species; 1 (2%) is originally of Polynesian introduction (Coconut (*Cocos nucifera*)); and 5 (10%) are indigenous, i.e., native to the Hawaiian Islands and also elsewhere. No plants considered endemic, or native only to the islands, were found.

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California grass along with scattered shrubs of Koa-haole and Indian pluchea, all introduced species, form the dominant vegetation on the site. The five native species (popolo, 'Uhaloa, Hau, Kipukai, and "Akulikuli) occur through the islands and the Pacific in similar environmental habitats.

There is little of botanical interest on the subject property and the proposed development is not expected to have a significant negative impact on the state-wide status of any of the species involved. None are considered threatened or endangered (U.S. Fish and Wildlife Service 1985; Herbst 1987). A similar botanical survey (Char 1989) conducted on lands nearby also resulted in similar findings.

Where feasible, it may be desirable to retain some of the larger trees as these add to the aesthetic value of the property and can also provide visual screening.

Fauna — See Appendix E

An Avifaunal and Feral Mammal Survey was conducted on the project site in November 1989 by Phillip L. Bruner, Assistant Professor of Biology; Director, Museum of Natural History, BYU-Hawaii. The objectives of the faunal survey were to:

- (1) Determine what species of birds and mammals occur or potentially might occur on the property.
- (2) Determine, within the time constraints available, the relative abundance of each species.
- (3) Check for the presence of any endangered species and note their particular use of the site, i.e., feeding, nesting, loafing.
- (4) Identify any special habitats that may occur on the property and suggest ways in which they might be protected.

The survey was conducted by walking the perimeter of the property and one transect through the center of the site. Census stations were established and eight minute counts of all birds seen and heard at these stations were recorded. Tallies of birds observed between these stations were also kept, and observations on surrounding lands were made. Mammals were surveyed by visual means and by noting the presence of scats and tracks. No trapping of mammals was attempted in order to determine their relative abundance.

The nearby James Campbell National Wildlife Refuge, Kii Unit is the home of four endemic and endangered species: Common Moorhen (*Gallinula chloropus sandvicensis*),

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American Coot (*Fulica americana alai*), Black-necked Stilt (*Himantopus mexicanus knudseni*) and Koloa (*Anas wyvilliana*). No wetlands exist on the property, thus the only likely occurrence of these species would be when they might fly over the site.

The endemic Pueo or Short-eared Owl (*Asia flammeus sandwichensis*) is listed by the State of Hawaii as endangered on Oahu. One Pueo was observed hunting over open land to the northwest of the site. This species of owl forages during the day as well as at night.

The only indigenous species recorded was the Black-crowned Night Heron (*Nycticorax nycticorax*). Two night heron flew over the property on their way to the wildlife refuge during the survey. This species is the only native waterbird in Hawaii that is not listed as endangered. Their statewide population has likely increased in recent years due to the development of aquaculture.

Two species of migratory shorebirds were recorded during the survey, the Ruddy Turnstone (*Arenaria interpres*) and Pacific Golden Plover (*Pluvialis fulva*). The latter species is known to be very site-faithful and territorial (Johnson et al. 1981, 1989). A total of 18 plover and 12 turnstone were observed. These birds were seen flying over the property and on the open ground to the NNW of the site.

A total of 15 species of exotic birds were recorded on the survey. Two species not recorded but likely present on or near the property are the Common Barn Owl (*Tyto alba*) and Java Sparrow (*Padda oryzivora*) (Bruner 1989, Pratt et al. 1987).

Mongoose (*Herpestes auropunctatus*) and cats were both seen on the property. Rats and mice were not recorded but undoubtedly are present at this site. Derelict buildings and grass fields are favorite haunts of these rodents. This survey found no unusual concentrations of mammals. The endemic and endangered Hawaiian Hoary Bat (*Lasiurus cinereus semotus*) is known from Oahu (Tomich, 1986) but was not recorded on this survey.

Mitigative Measures

No special habitats were found on the property. Care, however, should be taken in the development of the proposed residential site that no wastes are allowed to contaminate the water supply of the nearby refuge, an essential property for native endangered waterbirds.

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Noise and dust from construction could also be a concern. This might be minimized, to some degree, by the erection of a temporary barricade.

At some point in time, the refuge will need to construct a dog proof fence. The boundary fence, at present, is easily violated by dogs and people and is in need of repair. As residential units are constructed nearby the number of dogs and children will likely increase and may place an additional strain on the ability of the wetland to provide an adequate refuge for waterbirds. Improving the fence and planting a visual buffer of trees, such as Ironwood, may eventually be the answer to this potential problem.

g. **Agricultural Lands**
See Appendix C

As assessment of the impact of the proposed Kahuku Residential project on agriculture was presented by Decision Analysis Hawaii, Inc. (Bruce Plasch). Currently, the majority of the property is used for grazing horses. In order to continue grazing operations, other lands in the Kahuku area could be made available by The Estate of James Campbell.

The affected acreage consists of two soil types. The predominant soil type, which comprises about 85 percent of the project area, is JaC, "Jaucas sand," which has slopes of 0 to 15 percent. The other soil type, KmbA, Keaau clay, saline, comprises about 15 percent of the area and has slopes of 0 to 2 percent. JaC can be used for pasture, sugarcane and truck crops, while KmbA can be used for pasture.

The soils within the petition area have been rated in terms of four classification systems commonly used in Hawaii: (1) Land Capability Grouping, (2) Agricultural Lands of Importance to the State of Hawaii, (3) Overall Productivity Rating, and (4) Proposed Land Evaluation and Site Assessment. These classification systems are discussed below.

- (1) SCS: The SCS classifications system rates soils at eight levels, ranging from the highest classification level, "I," to the lowest level, "VIII." The JaC soils, which take up about 85 percent of the project area, are rated IVs when irrigated, which indicates that they have very severe limitations that reduce the choice of plants, require very careful management, or both. These limitations are due to stoniness, shallowness, unfavorable texture, or low water-holding capacity. The KmbA soils, which comprise the remaining 15 percent of the area are rated VIw. The VI rating indicates that the soils have severe limitations that make them generally unsuited cultivation and limit

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their use to pasture or range, woodland, or wildlife habitat, while the "W" indicates that the soils are severely limited by excess water.

- (2) ALISH: This system classifies lands into three categories: (a) "Prime" agricultural land which is land that is best-suited for the production of crops because of its ability to sustain high yields with relatively little input and with the least damage to the environment; (b) "Unique" agricultural land which is non-prime agricultural land that is currently used for production of specific high-value crops; and (c) "Other" agricultural land which is non-prime and non-unique agricultural land that is of importance to the production of crops.

About 85 percent of the project area is not rated by ALISH, while the remaining land is rated "Other" agricultural land.

- (3) LSB: All soils in the project area are rated "B." "A" represents the class of highest productivity and "E" the lowest.
- (4) LESA: If the LESA classification approach were applied to this project site, none of the site would be termed "important agricultural lands" (IAL), since they must have a rating of 66 or above out of a possible total of 100. The ratings for JaC and KmB are 41 and 24, respectively.

The project lands are poorly suited for crop production as indicated by relatively poor soils, lack of water, exposure to strong winds and salt spray, and proximity to nearby homes. Furthermore, the acreage involved is too small to adversely affect the growth of diversified agriculture, particularly in view of the large amount of land that has been released from plantation agriculture and which remains available for diversified agriculture.

Finally, the Kahuku Residential project is consistent with the agricultural portion of the Hawaii State Plan, the State Agriculture Functional Plan, and the General Plan of the City and County of Honolulu. The thrust of all three plans calls for preserving the economic viability of plantation agriculture and promoting the growth of diversified agriculture. To accomplish this, an adequate supply of agriculturally suitable land and water must be assured by protecting high-quality agricultural lands from development. However, marginal or non-essential agricultural lands would be made available for appropriate urban uses. The Kahuku Residential project would not adversely affect the economic viability of plantation agriculture

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since no plantation lands are involved, and would not adversely affect the growth of diversified agriculture. The lands involved are lower-quality agricultural lands suitable for urban uses. The project would contribute in a small way to the State's pressing need for housing.

h. Open Space

An assessment of the visual impacts from Kamehameha Highway as well as from other vantage points in the area has been made. See discussion in *Section VI E.3*. Approximately 30,450 square feet will be dedicated to meet Park Dedication Requirements.

i. Climate and Meteorology

Based on historical records from the State Weather Station No. 907.00 at the Kuilima Resort north of the project site, median annual rainfall is 39.4 inches. In accordance with Thornwaite's scheme for climatic classification, the area is considered a subhumid grassland (C.W. Thornwaite, *Climates of North America According to a New Classification*, Georg. Rev. 21: 1931).

On an annual basis, wind conditions in the area are predominated by brisk northeasterly tradewinds; however, there is a marked seasonal difference in velocity and persistence of such winds. The tradewinds tend to decline in the fall and winter months turning into more light and variable winds.

6. Hazards

a. Nuisances and site safety

N/A

b. Thermal Explosives

N/A

c. Airport Clear Zone (APZ)

N/A

F. PROPOSED MITIGATIVE MEASURES

The project's impact and the appropriate mitigative measures to minimize and/or offset any adverse effects are discussed under the appropriate Sections of this Report.

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VII. ALTERNATIVES CONSIDERED

No other alternative was considered. Other lands are available for diversified agriculture and grazing. The site is ideally located for residential development. Infrastructure and public utilities are available. Schools, public facilities and community shopping and recreational locations are situated at a convenient distance from the site. An expanded sewage treatment plant, currently in the planning process could accommodate not only the proposed development but the neighboring Kahuku Village Makai Subdivision as well.

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VIII. NECESSARY PERMITS AND APPROVALS

In addition to the processing of the requested Development Plan Amendment and Land Use Boundary Change, the following major Permits and Approvals are necessary during which time the project will undergo further review:

- Zone Change
- Shoreline Management Permit
- Subdivision

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IX. SUMMARY/DETERMINATION

The proposed residential development will provide new homes for the residents of the area. Design and siting of structures, layout of infrastructure, and visual impacts are intended to complement the surrounding area. Expansion of the sewage treatment would accommodate the project as well as benefit the neighboring Kahuku Village Makai Subdivision. Development of the residential project would provide housing in the area which is experiencing economic growth.

The development of the site for residential purposes does not pose any known constraints. Mitigative measures are available to avoid any potential risk to the James Campbell Wildlife Preserve. The infrastructure system to serve the project is either in place or will be provided by the applicant within the immediate future. The project will not adversely impact the adjacent area or any environmental resources. Permits will be applied for and coordinated with the appropriate agencies.

Based upon an evaluation of the factors relevant to the proposed residential project, a negative declaration would be an appropriate determination for the amendment application. The Department of General Planning is the Accepting Authority.

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X. NOTIFICATION REQUIREMENTS

A. NOTIFICATION LIST

The following parties have been furnished with a copy of the Summary Sheet and a map of the proposed amendment:

1. Koolauloa Neighborhood Board #28
c/o Hauula Satellite City Hall
54-010 Kukuna Road
Hauula, Hawaii 96717
2. Hauula Satellite City Hall
54-010 Kukuna Road
Hauula, Hawaii 96717
3. Kawela Bay Community Association
P.O. Box 475
Kahuku, Hawaii 96731
4. Koolauloa Community Council
c/o Marth Kealohapuni Turner
P.O. Box 12
Hauula, Hawaii 96717
5. Kahuku Hospital
P.O. Box 218
Kahuku, Hawaii 96731
6. Kawela Bay Community Association
P.O. Box 475
Kahuku, Hawaii 96731
7. Kuilima Estates East Owners' Association
c/o Resident Manager
57-091 Lalo Kuilima Place #63
Kahuku, Hawaii 96730
8. Kaaawa Community Association
P.O. Box 620
Kaaawa, Hawaii 96730
9. Hanohano Hale Owners Association
c/o Resident Manager
53-549 Kamehameha Highway
Hauula, Hawaii 96717
10. Hui O Kanani O Kahana
P.O. Box 680
Kaaawa, Hawaii 96730
11. Kaaawa Community Association
P.O. Box 620
Kaaawa, Hawaii 96730

PROPOSED KAHUKU RESIDENTIAL

12. Kuilima Estates Owners Association
c/o Resident Manager
P.O. Box 241
Kahuku, Hawaii 96731
13. Punaluu Community Association
P.O. Box 239
Hauula, Hawaii 96717
14. West Kawela Bay Community Association
c/o North Shore Realty
59-712 Kamehameha Highway
Haleiwa, Hawaii 96712
15. Kahuku Village Association
P.O. Box 278
Kahuku, Hawaii 96731
16. U.S. Fish and Wildlife
P.O. Box 278
Kahuku, Hawaii 96731
17. Amorient Aquafarm, Inc.
P.O. Box 131
Kahuku, Hawaii 96731
18. Kahuku Housing Corporation
P.O. Box 188
Kahuku, Hawaii 96731
19. Kahuku Farmers Association
P.O. Box 188
Kahuku, Hawaii 96731
20. Sisouck Anoulack
24 Hialoa Street #305
Honolulu, Hawaii 96817
21. Melvin Matsuda
59-715 Maulukua Street
Haleiwa, Hawaii 96712
22. Rey Huang
59-486 Kamehameha Highway
Haleiwa, Hawaii 96712

PROPOSED KAHUKU RESIDENTIAL

B. CERTIFICATION

Ordinance 84-111 states:

No application for Development Plan Land Use Map amendment shall be accepted for processing unless the applicant notifies, by mail, all owners, lessees, sub-lessees and residents of the affected property and of each abutting parcel.

I hereby certify that I have complied with the notification requirements of Ordinance 84-111.



WILLIAM E. WANKET
Consultant for
THE ESTATE OF JAMES CAMPBELL

PROPOSED KAHUKU RESIDENTIAL

XI. LIST OF CONSULTANTS INVOLVED IN PREPARATION OF DP AMENDMENT, ENVIRONMENTAL ASSESSMENT, AND LAND USE BOUNDARY CHANGE APPLICATION

This report was prepared for The Estate of James Campbell by William E. Wanket, Inc. The following identifies the consultants involved in the preparation of their respective contributions.

<u>FIRM</u>	<u>TASK</u>	<u>INDIVIDUAL</u>
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Char and Associates	Botanical Survey	Winona Char
Phillip L. Bruner	Survey of Avifauna and Feral Mammals	Phillip L. Bruner
Archaeological Consultants of Hawaii, Inc.	Archaeological Survey	Joseph Kennedy
Michael S. Chu	View Assessment/ Graphics	Michael S. Chu
Pacific Planning & Engineering, Inc.	Traffic Impact Analysis	Conrad Higashionna/ Sterling Chow
Decision Analysts Hawaii, Inc.	Agricultural Impact	Bruce Plasch
J.W. Morrow	Air Quality Impact	James W. Morrow
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PROPOSED KAHUKU RESIDENTIAL

APPENDIX A

**AIR QUALITY IMPACT REPORT,
KAHUKU RESIDENTIAL PROJECT**

J.W. Morrow, Environmental Management Consultant

APPENDIX A

AIR QUALITY IMPACT REPORT
KAHUKU RESIDENTIAL PROJECT
December 13, 1989

PREPARED FOR
William E. Wanket, Inc.
AND
The Estate of James Campbell

PREPARED BY
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1. INTRODUCTION

An 87-unit residential development is being proposed for a 16.3-acre parcel at Kahuku Village on northern Oahu (Figure 1). The project, consisting of all single-family homes is expected to be completed by 1993.

The purpose of this report is to assess the air quality impact of the proposed development. The project can be considered an "indirect source" of air pollution as defined in the federal Clean Air Act [1] since it will attract mobile sources of air pollution, i.e., motor vehicles. Thus, much of the focus of this analysis is on the project's ability to generate traffic and the resultant impact on air quality. Air quality impact was evaluated for existing (1989) and future (1993) conditions.

The following direct and indirect impacts have also been addressed:

- offsite impacts due to electrical generation
- refuse disposal at a resource recovery facility
- onsite and offsite construction impacts

2. AIR QUALITY STANDARDS

A summary of State of Hawaii and national ambient air quality standards is presented in Table 1 [2,3]. Note that Hawaii's standards are not divided into primary and secondary standards as are the Federal standards.

Primary standards are intended to protect public health with an adequate margin of safety while secondary standards are intended to protect public welfare through the prevention of damage to soils, water, vegetation, man-made materials, animals, wildlife, visibility, climate, and economic values [4].

Some of Hawaii's standards are clearly more stringent than their Federal counterparts but, like their Federal counterparts, may be exceeded once per year. It should also be noted that in April, 1986, the Governor signed amendments to Chapter 59 (Ambient Air Quality Standards) making the State's standards for particulate matter and sulfur dioxide the same as national standards. In the case of particulate matter, however, this uniformity did not last long. On July 1, 1987, the EPA revised the Federal particulate standard to apply only to particles 10 microns or less in diameter (PM-10) [5], leaving the State once again with standards different than the Federal ones.

In the case of the automotive pollutants [carbon monoxide (CO),

oxides of nitrogen (NOx), and photochemical oxidants (Ox)], there are only primary standards. Until 1983, there was also a hydrocarbons standard which was based on the precursor role hydrocarbons play in the formation of photochemical oxidants rather than any unique toxicological effect they had at ambient levels. The hydrocarbons standard was formally eliminated in January, 1983 [6].

The U.S. Environmental Protection Agency (EPA) is mandated by Congress to periodically review and re-evaluate the Federal standards in light of new research findings [7]. The last review resulted in the relaxation of the oxidant standard from 160 to 235 micrograms/cubic meter (ug/m³) [8]. The carbon monoxide (CO), particulate matter, sulfur dioxide (SO₂), and nitrogen dioxide (NO₂) standards are currently under review, but no new standards have been proposed [9].

Finally, the State of Hawaii also has fugitive dust regulations for particulate matter (PM) emanating from construction activities [10]. There simply can be no visible emissions from fugitive dust sources.

3. EXISTING AIR QUALITY

3.1 General. The State Department of Health maintains a network of air monitoring stations around the state to gather data on the following regulated pollutants:

- o total suspended particulates (TSP)
- o particulate matter <10 microns (PM-10)
- o sulfur dioxide (SO₂)
- o carbon monoxide (CO)
- o ozone (O₃)
- o lead (Pb)

In the case of TSP, PM-10, and SO₂, measurements are made on a 24-hour basis to correspond with the averaging period specified in the standards. Samples are collected once every six days in accordance with U.S. Environmental Protection Agency (EPA) guidelines. Carbon monoxide and ozone, however, are measured on a continuous basis due to their short-term (1-hour) standards. Lead concentrations are determined from the TSP samples which are sent to an EPA laboratory for analysis. Note that the lead standard is a quarterly average.

There is no Department of Health (DOH) air monitoring station in the immediate vicinity of the project site. The nearest site on the windward side of Oahu is at Waimanalo, some 28 miles southeast of Kahuku. The DOH also monitors air quality at its downtown Honolulu building some 26 miles south-southeast of the housing project. It seems safe to assume that present air quality is good most of the time since there are no large stationary sources in the vicinity, and the immediate area is not densely populated. The primary source of air pollution is the motor vehicle traffic along Kamehameha Highway.

3.2 Department of Health Monitoring Sites. Recent data from the Waimanalo and Honolulu stations are summarized in Tables 2 - 5. The data indicate that total suspended particulate (TSP) and sulfur dioxide (SO₂) standards are being met. In fact, much of the time sulfur dioxide concentrations are below the detectable limit of the measurement method being employed. Carbon monoxide (CO) levels are also below State standards most of the time with only occasional exceedances.

Photochemical oxidants are secondary pollutants formed in the atmosphere largely as a result of anthropogenic emissions of hydrocarbons and oxides of nitrogen. Since there are no ambient standards for hydrocarbons, there is no monitoring. In the case of NO₂, the State ceased routine monitoring in 1976. As indicated by federal and state standards, ozone is monitored at Sand Island as a surrogate for photochemical oxidants. Recent monitoring data from that station indicate that the state's 1-hour standard is being met over 99% of the time.

As noted above, the State also has been having particulate samples analyzed for lead content, and Table 5 summarizes ambient lead levels in recent years. Generally, airborne lead levels have declined as expected due to the federal program for gradual phaseout of leaded gasoline. Particulate lead accumulated over the years in roadside soils and plants, however, will remain indefinitely in the area and provide inhalation exposure whenever dust is re-entrained in the air as a result of scouring winds or mechanical disturbance due to vehicular motion.

3.3 Onsite Carbon Monoxide Sampling. In conjunction with this study, air sampling was conducted at a site along Kamehameha Highway across from the old sugar mill in Kahuku during December, 1989.

The actual sampling site was 10 meters from the road edge on the southwest (mauka) side due to the winds prevailing at the time. A continuous carbon monoxide (CO) instrument was set up and operated during the p.m. peak traffic hour based on a review of historical traffic data by the traffic consultant [11]. An anemometer and vane were installed to record onsite surface

winds. A simultaneous manual count of traffic along Kamehameha Highway was also made. The variability of each of the parameters measured during the peak hour is clearly seen in Figure 2.

Onsite surface winds were generally northwesterly and thus at an acute angle with Kamehameha Highway. Wind speeds were quite low during the sampling period, i.e., generally less than 1.0 meter per second (m/sec). Atmospheric stability was neutral to slightly unstable. The total 2-way traffic count of 987 vehicles was comparable to that reported by the traffic consultant [12]. CO concentrations compared quite closely with the computer-predicted concentrations discussed in Section 6.

4. CLIMATE & METEOROLOGY

4.1 Temperature & Rainfall. The National Climatic Data Center in its 1982 annual summary for Honolulu notes that:

"Hawaii's equable temperatures are associated with the small seasonal variation in the amount of energy received from the sun and the tempering effect of the surrounding ocean. The range of temperature averages only 7 degrees between the warmest months (August and September) and the coolest months (January and February) and about 12 degrees between day and night. Daily maximums run from the high 70's in winter to the mid-80's in summer, and daily minimums from the mid-60's to the low 70's. However, the Honolulu Airport area has recorded as high as 93 degrees and as low as 53" [12].

Based on historical records from the State Weather Station No. 907.00 at the Kuilima Resort north of the project site, median annual rainfall is 39.4 inches. In accordance with Thornwaite's scheme for climatic classification, the area is considered a subhumid grassland [13].

4.2 Surface Winds. Kaneohe Marine Corps Air Station (KMCAS) is the nearest long-term meteorological data collection station to the project. Records from KMCAS were therefore reviewed with particular attention to the p.m. peak traffic hours. This examination revealed seasonal and diurnal differences both in direction and velocity. Figures 3 and 4 depict directional wind roses for the 3:00 - 5:00 p.m. period during the months of January and August. The predominance of northeast tradewinds during the summer in contrast to the more variable nature of the winter months is quite clear.

The winter months also are characterized by generally lower wind velocities as evidenced again by the January-August comparison, this time presented in tabular form (Tables 6 and 7). Light,

variable winds are much more prevalent during January than in August, and not surprisingly, it is during the winter months that most of the high carbon monoxide levels are recorded by the Department of Health in Honolulu.

5. HIGHWAYS AND TRAFFIC

As noted above, the principal access road to the project area is Kamehameha Highway. It is a typical 2-lane rural roadway as can be seen in Figure 5. Because of the resort activity in the area, the peak traffic volumes tend to occur during weekend afternoons. Based on the traffic consultant's review of State DOT records, the peak period was between 1:30 and 3:30 p.m. on Saturday; thus, both traffic and air quality impact analyses focused on this period.

Existing traffic volumes as well as projections for future volumes used in this impact analysis were obtained from the traffic consultant [12].

6. MOBILE SOURCE IMPACT

6.1 Emission Factors. Automotive emission factors for carbon monoxide (CO) were generated for calendar years 1989 and 1993 using the Mobile Source Emissions Model (MOBILE-3) [14]. To localize emission factors as much as possible, the August, 1988 age distribution for the City & County of Honolulu [15] was input in lieu of the national statistics normally used.

6.2 Microscale Analysis. Analyses such as this generally involve estimation of concentrations of non-reactive pollutants. This is due to the complexity of modeling pollutants which undergo chemical reactions in the atmosphere and are subject to the effects of numerous physical and chemical factors which affect reaction rates and products. For projects involving motor vehicles as the principal air pollution source, carbon monoxide is normally selected for modeling because it has a relatively long half-life in the atmosphere (about 1 month) [16], and it comprises the largest fraction of automotive emissions.

In this instance, a microscale screening analysis was performed for the Kahuku Golf Course Access Road intersection with Kamehameha Highway. The updated version of an EPA guideline model CALINE-4 [17,18] was employed with an array of receptors spaced at distances of 10 - 30 meters from the road edge. Because of the growing level of urbanization and traffic in the area, a background CO concentration of 1.0 milligram per cubic meter (mg/m³) was assumed.

Worst case meteorological conditions were selected for the p.m. peak traffic hours. A wind speed of 1 meter per second, an acute

wind/road angle, and neutral stability (Pasquill-Gifford Class "D") [19], were all selected to maximize concentration estimates in the vicinity of the intersections. Review of the traffic data and preliminary modeling indicated that east-southeasterly winds were most likely to produce the maximum CO concentrations near the intersections under study; thus, this wind direction was input for the modeling.

Maximum one- and eight-hour carbon monoxide (CO) concentrations were then computed for the peak traffic hours. The latter were obtained by multiplying the maximum 1-hour values by a "persistence" factor of 0.6 as recommended in an EPA publication on indirect source analysis [20]. The analyses were performed for existing conditions (1989) and future conditions (1993) both with and without the proposed project. The results are summarized in Figures 6 and 7.

7. OFF-SITE STATIONARY SOURCE IMPACT

7.1 Electrical Generation. The estimated 680,000 kilowatt hours of annual electrical demand by full buildout of the proposed facilities will necessitate the generation of electricity by power plants. Currently, most of Oahu's electrical energy is generated at Hawaiian Electric Company's (HECO) Kahe Generating Station located near Nanakuli on the leeward coast of Oahu. This is currently a six-unit, approximately 650-megawatt facility firing low-sulfur fuel oil. A seventh 150-megawatt unit was proposed by HECO [21], but more recently two outside companies have proposed building a new gas turbine and coal-fired power plant at Campbell Industrial Park and selling power to the utility [22]. For the purposes of this analysis, oil-firing was assumed. Estimates of annual emissions were computed based on EPA emission factors and the fuel required to meet a 680,000 Kwhr demand. The results are presented in Table 8.

7.2 Solid Waste Disposal. The refuse generated by the residents of the 87 homes will require disposal. Presently, about 80% of Oahu's refuse is being landfilled with the remaining 20% being burned at the Waipahu Incinerator [23]. In the future, most refuse will be burned at the City's recently completed resource recovery facility at Campbell Industrial Park which is scheduled for full startup in 1990. Estimates of annual emissions attributable to the combustion of refuse at that facility are included in Table 8.

8. CONSTRUCTION IMPACT

The principal source of short-term air quality impact will be construction activity. Construction vehicle activity will increase automotive pollutant concentrations along the principal

access roads as well as in the vicinity of the project site itself. During off-peak hours, the additional construction vehicle traffic should not exceed road capacities although the presence of large trucks can reduce a roadway's capacity as well as lower average travel speeds thereby contributing to additional air pollution emissions.

The site preparation and earth moving will create particulate emissions as will building and on-site road construction. Construction vehicles movement on unpaved on-site roads will also generate particulate emissions. EPA studies on fugitive dust emissions from construction sites indicate that about 1.2 tons/acre per month of activity may be expected under conditions of medium activity, moderate soil silt content (30%), and precipitation/evaporation (P/E) index of 50 [24].

Since some of the onsite soils are clays, in all probability having silt content comparable to the 30% cited above [25], and the computed P/E Index for the area is 52, thus comparable to the aforementioned EPA case, it may be assumed that there is a potential for fugitive dust problems.

In addition to the onsite impacts attributable to construction activity, there will also be offsite impacts due to the operation of concrete batching plants needed for construction. Since it is also too early to identify specific facilities that will be providing the concrete, the discussion of air quality impacts is necessarily generic.

Design and operating features of a typical concrete batching plant were obtained for this analysis. This plant (Rex Transit Mix Batch Plant, Model LO GO 5) [26], is a portable unit capable of producing up to 100 cubic yards of concrete per hour.

Assuming 8 hours/day operation and published EPA emission factors [24] for both direct plant emissions and fugitive dust emissions, estimates of worst case ambient impact were derived using the PTPLU screening model [27]. Ninety percent control of particulate emissions from the plant itself and 60% control of fugitive dust emissions from the process were assumed. One-hour concentration estimates were adjusted to 8-hour averages using an EPA-recommended factor [28] and then to 24-hour averages based on a weighted averaging technique. The worst case concentration of total suspended particulates (TSP) was thus estimated to be 105 micrograms/cubic meter ($\mu\text{g}/\text{m}^3$) due to the plant operation.

Since it is not known where exactly the plant(s) will be located and thus what the background concentration of TSP will be, it is somewhat difficult to predict cumulative concentrations for comparison with standards. However, if the batch plant's 105 $\mu\text{g}/\text{m}^3$ were assumed to be all < 10 microns and were added to the

second highest 24-hour PM-10 concentration (63 ug/m3) from the 1988 Waimanalo data, the sum would exceed the federal 24-hour standard of 150 ug/m3.

9. DISCUSSION AND MITIGATION

9.1 Microscale Analysis. While the project will impact local air quality, the 1-hour and 8-hour "worst case" carbon monoxide concentration estimates for existing as well as future "with project" and "without project" scenarios all indicated compliance with state and federal standards.

9.2 Stationary Source Impacts. The emissions estimates for electrical generation and solid waste disposal may be compared to the 1980 county emissions inventory in Table 9 in order to provide some perspective on their significance. The project's contribution to county emissions appears to be less than 0.1%. Inclusion of solar heating panels on these homes could reduce the already small impact further. Eventual county/state requirements regarding recycling and source separation of wastes will likewise reduce further the small impact of this project on waste disposal.

9.3 Short-Term Impact. Since as noted in Section 8, there is a potential for fugitive dust generation during construction, it will be important for adequate dust control measures to be employed during the construction period. Dust control could be accomplished through frequent watering of unpaved roads and areas of exposed soil. The EPA estimates that twice daily watering can reduce fugitive dust emissions by as much as 50%. The soonest possible landscaping or completed areas will also help. Use of dust screens may be necessary when excavation and other construction activities occur in close proximity to existing dwellings.

With regard to construction vehicle effects, proper maintenance of vehicle engines will help reduce emissions, while scheduling truck traffic during offpeak hours will reduce the impact on Kamehameha Highway.

Offsite construction related activity such as asphalt and concrete batching will affect air quality in the vicinity of the batch plant site but such plants must demonstrate compliance with state and federal standards before they receive operating permits.

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TABLE 1

SUMMARY OF STATE OF HAWAII AND FEDERAL
AMBIENT AIR QUALITY STANDARDS

POLLUTANT	SAMPLING PERIOD	FEDERAL STANDARDS		STATE
		PRIMARY	SECONDARY	STANDARDS
1. Total Suspended Particulate Matter (TSP) (micrograms per cubic meter)	Annual Geometric Mean	--	--	60
	Maximum Average in Any 24 Hours	--	--	150
2. PM-10 (micrograms per cubic meter)	Annual	50	50	--
	Maximum Average in Any 24 Hours	150	150	--
3. Sulfur Dioxide (SO ₂) (micrograms per cubic meter)	Annual Arithmetic Mean	80	--	80
	Maximum Average in Any 24 Hours	365	--	365
	Maximum Average in Any 3 Hours		1,300	1,300
4. Nitrogen Dioxide (NO ₂) (micrograms per cubic meter)	Annual Arithmetic Mean		100	70
5. Carbon Monoxide (CO) (milligrams per cubic meter)	Maximum Average in Any 8 Hours		10	5
	Maximum Average in Any 1 Hour		40	10
6. Ozone (micrograms per cubic meter)	Maximum Average in Any 1 Hour		235	100
7. Lead (Pb) (micrograms per cubic meter)	Maximum Average in Any Calendar Quarter		1.5	1.5

TABLE 2

AIR MONITORING DATA
WAIMANALO, OAHU
1988Total Suspended Particulates (TSP)
24-Hour Concentration (ug/m³)

<u>MONTH</u>	<u>SAMPLES</u>	<u>MIN.</u>	<u>MAX.</u>	<u>MEAN</u>
Jan 88	5	20	63	34
Feb 88	5	27	82	43
Mar 88	5	16	60	36
Apr 88	5	22	41	27
May 88	5	16	30	24
Jun 88	5	19	27	22
Jul 88	5	24	36	29
Aug 88	6	16	37	25
Sep 88	4	20	31	24
Oct 88	5	16	20	18
Nov 88	5	20	34	25
Dec 88	5	21	54	34
<u>ANNUAL</u>	<u>60</u>	<u>16</u>	<u>82</u>	<u>29</u>

SOURCE: Department of Health

TABLE 3

SUMMARY OF AEROMETRIC DATA COLLECTED
AT THE DEPARTMENT OF HEALTH BUILDING

1978 - 1987

TOTAL SUSPENDED PARTICULATES	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
(24-hr values, ug/m3)										
Period of sampling (mos.):	12	12	12	8	12	12	12	12	12	12
Number of samples:	60	8	61	35	55	56	60	59	57	53
Range of values:	14-53	22-62	23-103	23-75	11-42	14-58	11-48	10-48	11-61	14-59
Mean of values:	29	32	37	40	29	26	25	24	25	25
Number of times State AQS exceeded:	0	0	1	0	0	0	0	0	0	0
SULFUR DIOXIDE										
(24-hr values, ug/m3)										
Period of sampling (mos.):	12	12	12	8	12	12	12	12	12	12
Number of samples:	61	57	58	38	50	56	58	53	57	54
Range of values:	<5-44	<5-42	<5-60	<5-44	<5-38	<5-16	<5-45	<5-45	<5-6	<5-11
Mean of values:	18	22	18	19	11	<5	<5	<5	<5	<5
Number of times State AQS exceeded:	0	0	0	0	0	0	0	0	0	0
PHOTOCHEMICAL OXIDANTS										
(Daily 1-hr maxima, ug/m3)										
Period of sampling (mos.):	10	12	11	12	12	12	12	12	12	12
Number of samples:	284	337	295	314	335	348	296	341	348	342
Range of values:	10-84	10-80	10-84	10-104	0-151	0-123	0-104	8-198	10-88	4-84
Mean of values:	33	39	38	37	32	46	44	43	39	38
Number of times State AQS exceeded:	0	0	0	1	2	2	1	3	0	0

TABLE 4

SUMMARY OF AEROMETRIC DATA COLLECTED
AT THE DEPARTMENT OF HEALTH BUILDING

1971 - 1987

NITROGEN DIOXIDE (24-hr values)	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980-87
Period of sampling (mos.):	10	12	12	12	12	3	n.d.	n.d.	n.d.	n.d.
Number of samples:	83	113	99	90	91	22	n.d.	n.d.	n.d.	n.d.
Range of values:	<20-159	<20-236	<20-95	<20-95	16-70	12-63	n.d.	n.d.	n.d.	n.d.
Mean of values:	56	56	46	37	33	35	n.d.	n.d.	n.d.	n.d.
Number of times State AQS exceeded:	1	2	0	0	0	0	n.d.	n.d.	n.d.	n.d.

CARBON MONOXIDE (Daily 1-hr maxima)	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Period of sampling (mos.):	12	8	n.d.	n.d.	n.d.	6	12	12	12	12
Number of samples:	365	208	n.d.	n.d.	n.d.	169	318	342	348	345
Range of values:	0-20.7	0-17.3	Station moved to	Station moved to	Station moved to	0-8.6	0.6-10.9	0.0-10.4	0.2-13.5	0.3-11.1
Arithmetic mean of daily maximum values:	3.1	3.0		Kajmukl		2.4	2.4	1.5	2.2	1.7
Number of days State AQS exceeded:	19	10	10			0	1	1	3	1

TABLE 5
LEAD MONITORING DATA
HONOLULU, OAHU
1970-87

AVERAGE CONCENTRATION
(micrograms/cubic meter)

YEAR	1st QUARTER	2nd QUARTER	3rd QUARTER	4th QUARTER
1970	0.78	0.81	0.65	0.92
1971	1.65	0.63	0.65	1.05
1972	--	0.75	0.65	0.48
1973	0.52	0.52	0.72	0.55
1974	0.84	0.61	0.70	0.92
1975	0.65	0.81	0.59	1.05
1976	0.91	0.65	0.99	1.00
1977	0.89	0.59	0.48	0.80
1978	--	--	--	0.72
1979	0.39	0.25	0.26	0.42
1980	0.41	0.23	0.21	0.20
1981	0.25	--	--	--
1982	0.21	0.16	0.09	0.21
1983	n/a	n/a	n/a	n/a
1984	0.3	0.2	0.2	0.3
1985	0.1	0.03	0.02	0.1
1986	0.1	0.0	0.0	0.0
1987	0.0	0.0	0.0	0.0

Source: Department of Health

TABLE 6

JOINT FREQUENCY DISTRIBUTION
OF WIND SPEED AND DIRECTION
KANEHOE MARINE CORPS AIR STATION
JANUARY (3:00 - 5:00 P.M.)

Direction	Frequency of Occurrence (%)						Total
	1 - 3	4 - 6	Wind Speed (knots)			>21	
			7 - 10	11 - 16	17 - 21		
N	0.5	1.9	3.4	1.5	0.3		7.5
NNE	0.3	2.6	3.5	2.2	0.7	0.1	9.4
NE	0.4	2.4	3.2	5.1	1.0	0.5	12.6
ENE	0.3	1.2	4.9	7.0	1.1	0.1	14.6
E	0.5	1.1	5.0	5.1	1.3		13.1
ESE	0.5	2.1	4.3	3.8	0.3		11.0
SE	0.1	0.7	1.5	0.5	0.1		3.0
SSE	0.1	0.4	0.8	0.7		0.2	2.2
S	0.3	1.1	2.3	0.9	0.1	0.2	4.9
SSW	0.1	0.7	2.1	3.0	0.8	0.6	7.3
SW	0.3	0.6	1.5	1.6	0.5	0.4	4.9
WSW	0.3	0.4	0.5	0.6	0.1	0.1	2.0
W		0.2	0.1	0.1			0.3
WNW	0.2	0.4	0.3	0.3			1.1
NW	0.1	0.3	0.3	0.2			0.9
NNW	0.1	0.8	1.2	0.7	0.5	0.1	3.4
Calm							2.0
Total:	4.1	16.8	34.7	33.3	6.8	2.3	100.0

TABLE 7

JOINT FREQUENCY DISTRIBUTION
OF WIND SPEED AND DIRECTION
KANEHOE MARINE CORPS AIR STATION
AUGUST (3:00 - 5:00 P.M.)

Direction	Frequency of Occurrence (%)						Total
	1 - 3	4 - 6	Wind Speed (knots)			>21	
			7 - 10	11 - 16	17 - 21		
N		0.3	0.5				0.8
NNE		1.1	4.5	1.9	0.1		7.5
NE		0.9	7.9	15.1	1.0		24.9
ENE		0.8	9.4	33.3	4.0	0.1	47.7
E		0.2	2.6	8.8	1.8	0.1	13.5
ESE		0.1	0.5	3.5	0.5	0.1	4.6
SE	0.1			0.1			0.1
SSE					0.1	0.1	0.1
S		0.1		0.2			0.3
SSW							0.0
SW			0.1				0.1
WSW							0.0
W		0.1	0.1				0.2
WNW		0.1					0.1
NW							0.0
NNW			0.1				0.1
Calm							0.1
Total:	0.1	3.5	25.6	62.9	7.5	0.4	100.0

TABLE 8

Estimates of Annual Emissions Due to
Electrical Generation and Solid Waste Disposal
Kahuku Residential Project
1993

Pollutant	Emissions (T/Yr)	
	Electrical Generation	Solid Waste Disposal
Nitrogen oxides	2.47	0.53
Sulfur oxides	1.88	0.11
Particulate Matter	0.19	0.04
Carbon monoxide	0.12	0.46
Hydrocarbons	0.02	0.03

TABLE 9

1980 EMISSIONS INVENTORY
CITY & COUNTY OF HONOLULU

SOURCE CATEGORY	EMISSIONS (Tons/Year)				
	PM	SO _x	NO _x	CO	HC
Steam Electric Power Plants	2092	36,736	12,455	1,065	184
Gas Utilities	14	0	199	0	0
Fuel Combustion in Agricultural Industry	1088	579	358	0	31
Refinery Industry	622	7,096	2,149	266	2,584
Petroleum Storage	0	0	0	0	1,261
Metallurgical Industries	28	96	40	0	0
Mineral Products Industry	6,884	1,883	597	0	31
Municipal Incineration	42	145	2,029	0	184
Motor Vehicles	1,413	1,014	17,270	239,198	22,853
Construction, Farm and Industrial Vehicles	184	193	2,507	3,729	338
Aircraft	382	145	1,751	5,594	1,476
Vessels	42	386	438	533	123
Agricultural Field Burning	1,399	0	0	15,982	1,692
TOTAL:	14,191	48,274	39,792	266,367	30,758

SOURCE: State Department of Health

FIGURE 1
PROJECT LOCATION

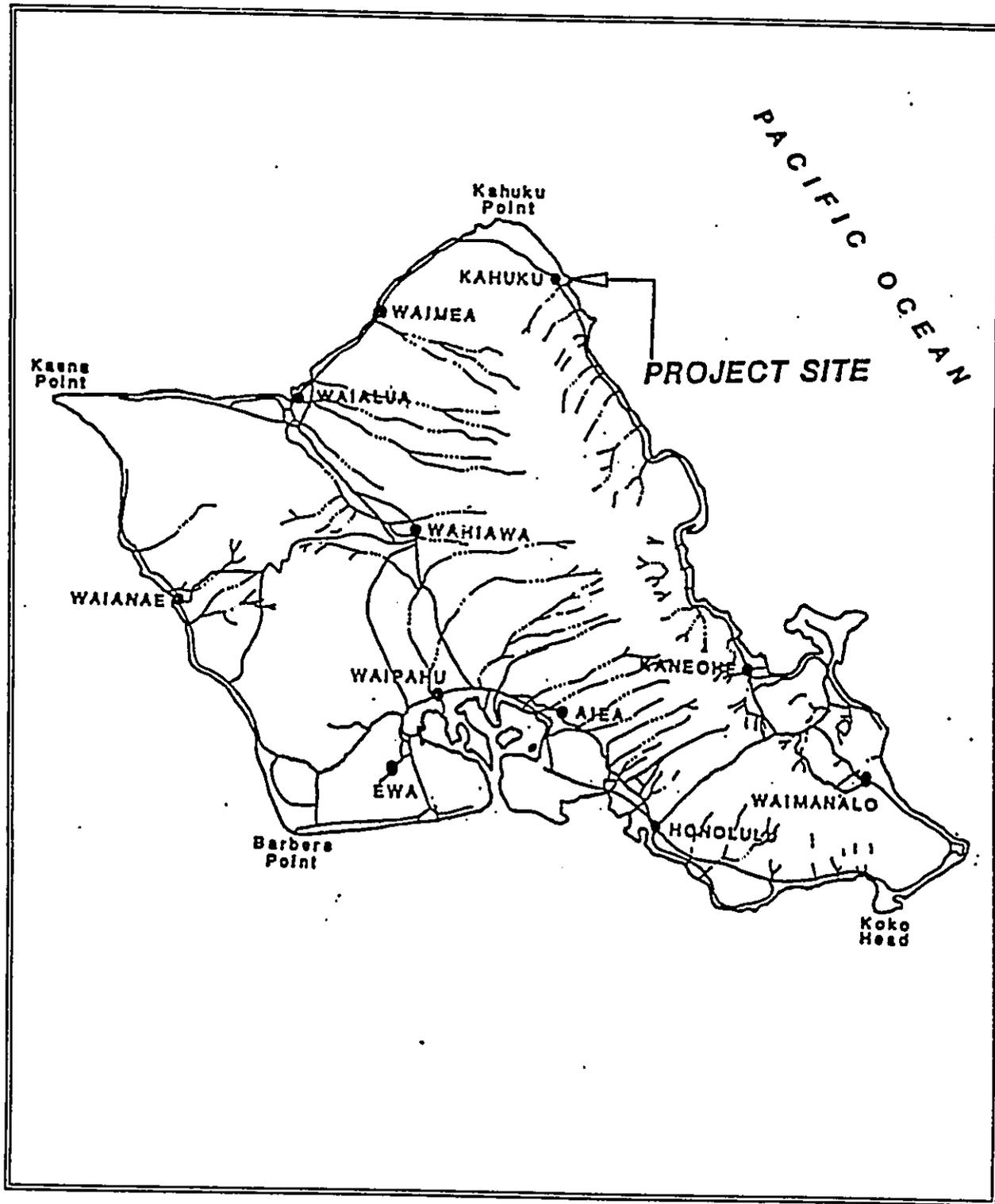
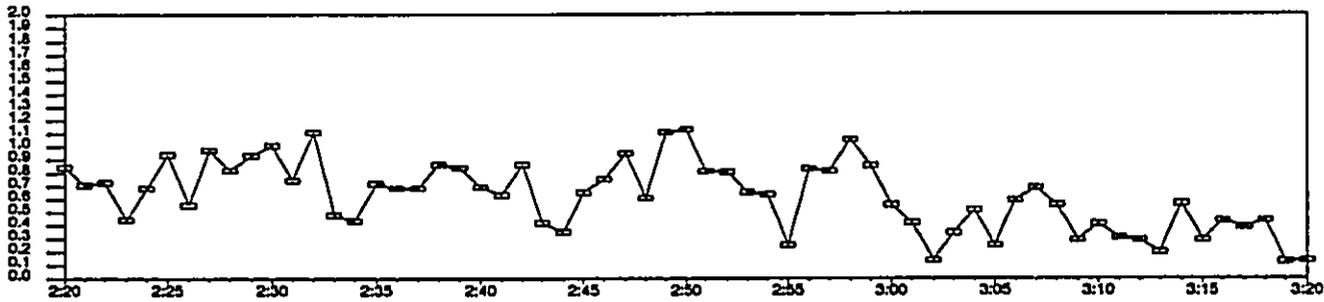


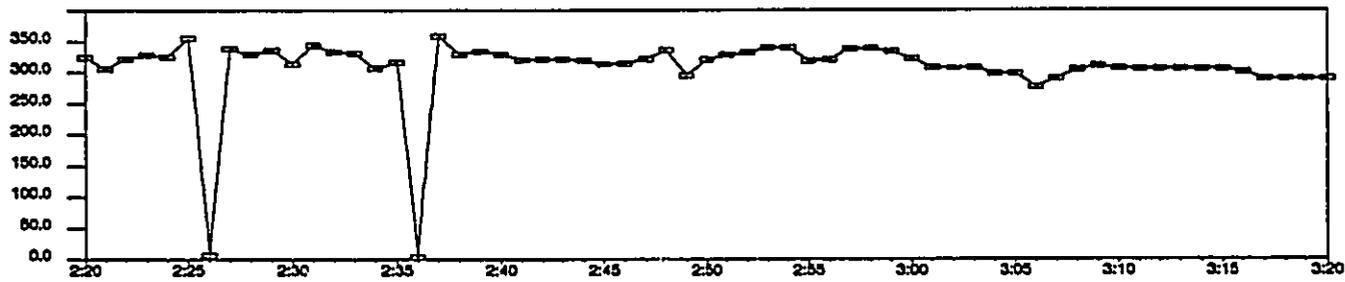
FIGURE 2

P.M. PEAK HOUR CONDITIONS
KAMEHAMEHA HIGHWAY AT KAHUKU SUGAR MILL
DECEMBER 2, 1989

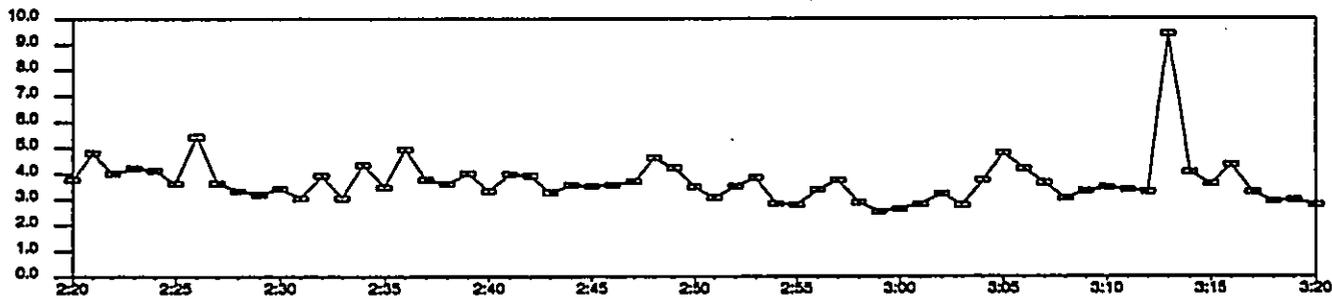
Wind Speed (m/sec)



Wind Direction (deg)



CO (mg/m³)



Traffic (5-min counts)

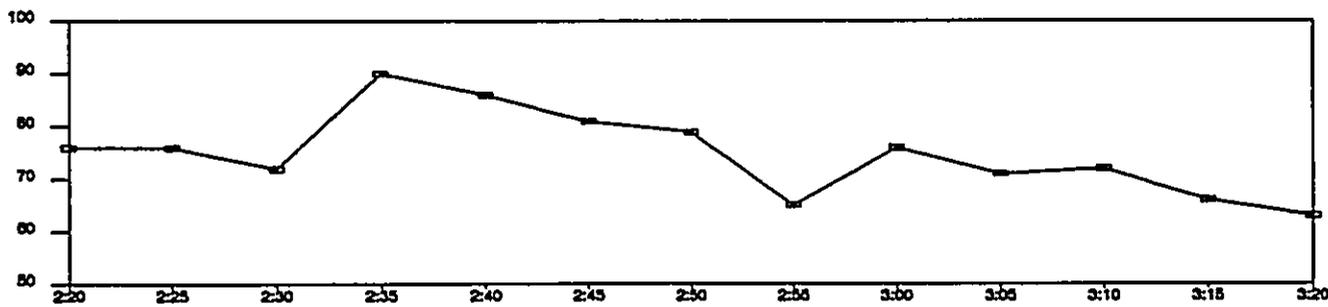
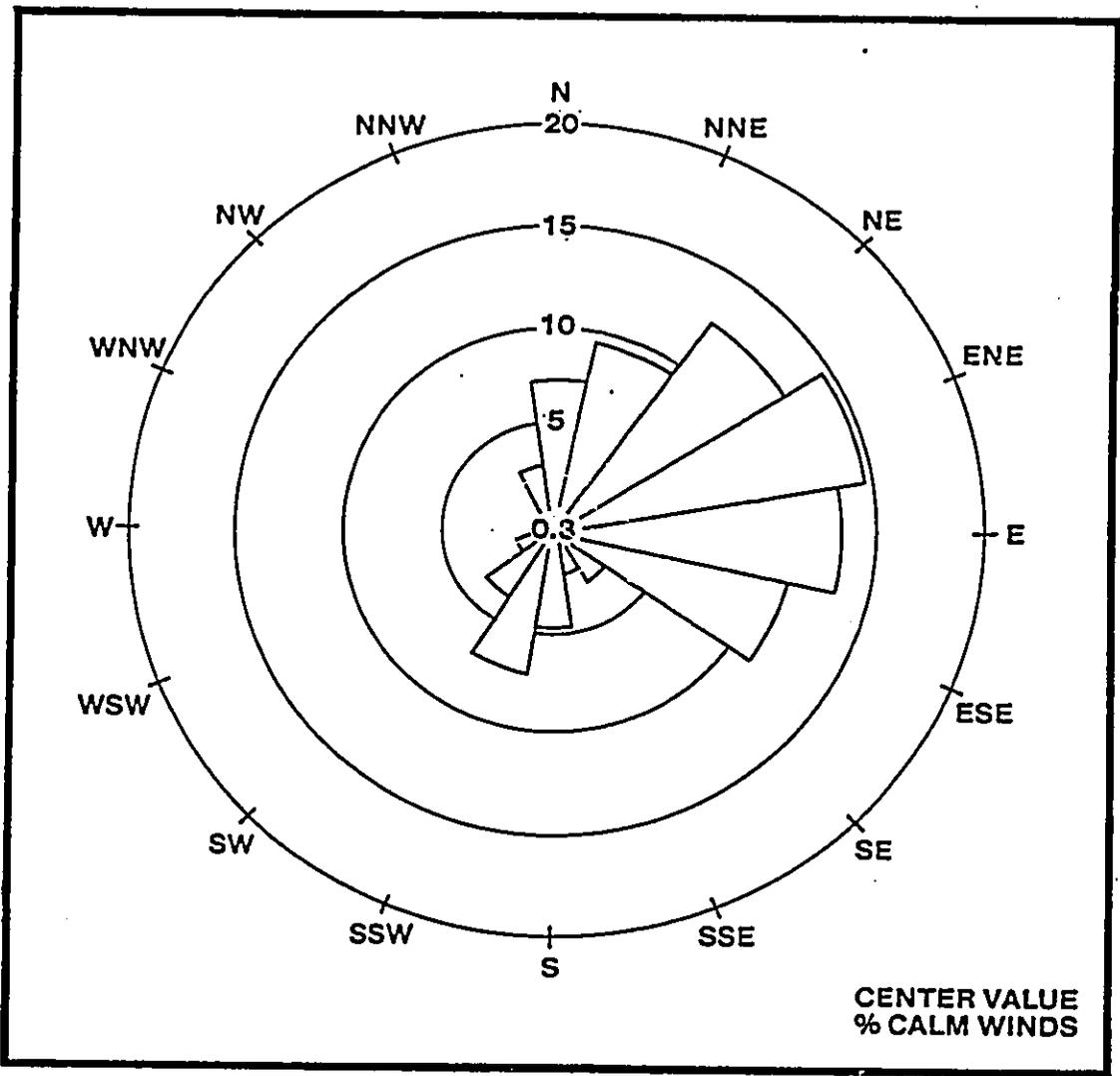


FIGURE 3

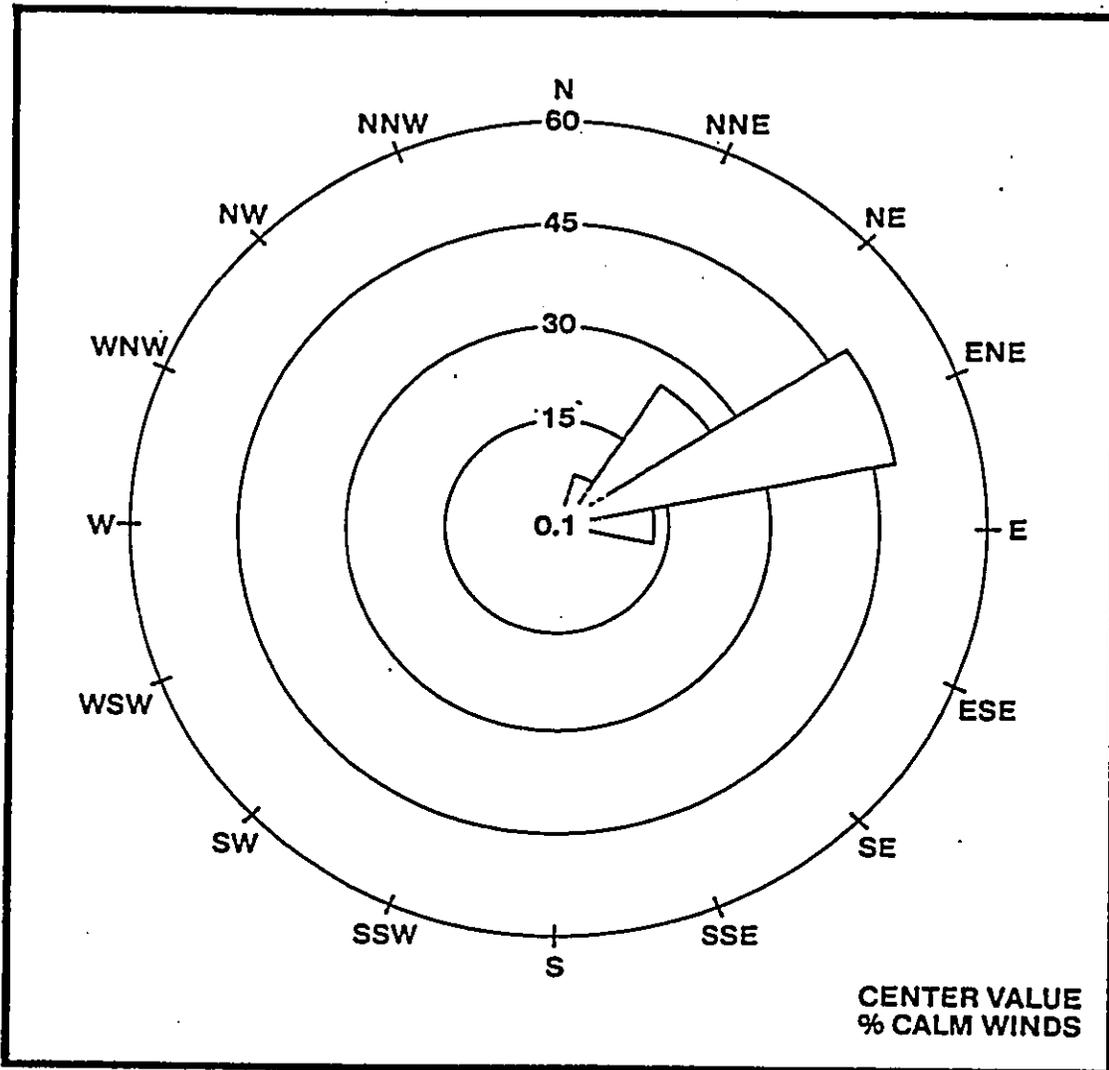
JANUARY WIND ROSE
KANEHOHE MARINE CORPS AIR STATION
3:00 - 5:00 PM



SOURCE: NATIONAL WEATHER SERVICE

FIGURE 4

AUGUST WIND ROSE
KANEHOE MARINE CORPS AIR STATION
3:00 - 5:00 PM



SOURCE: NATIONAL WEATHER SERVICE

FIGURE 5
KAMEHAMEHA HIGHWAY
IN THE VICINITY OF THE KAHUKU SUGAR MILL
DECEMBER, 1989

Facing
Northwest



Facing
Southeast

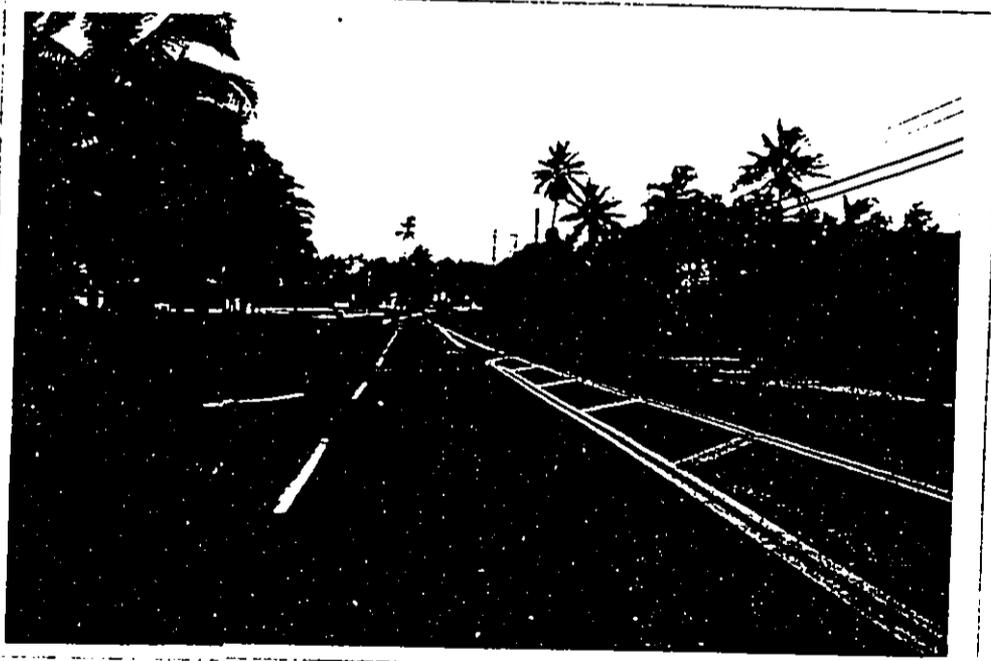
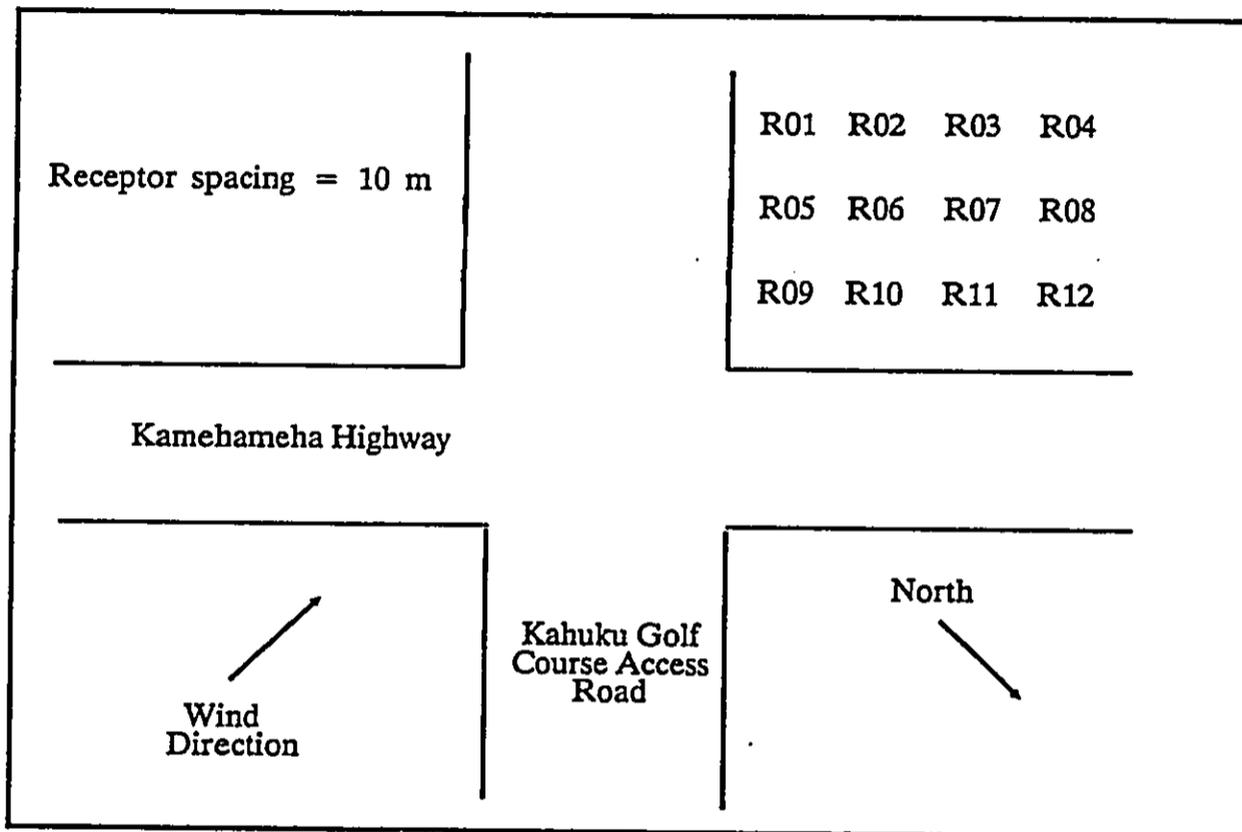


FIGURE 6

ESTIMATES OF MAXIMUM 1-HOUR
CARBON MONOXIDE CONCENTRATIONS
Kamehameha Highway at the Kahuku Golf Course Access Road
P.M. Peak Hour
1989 - 1993

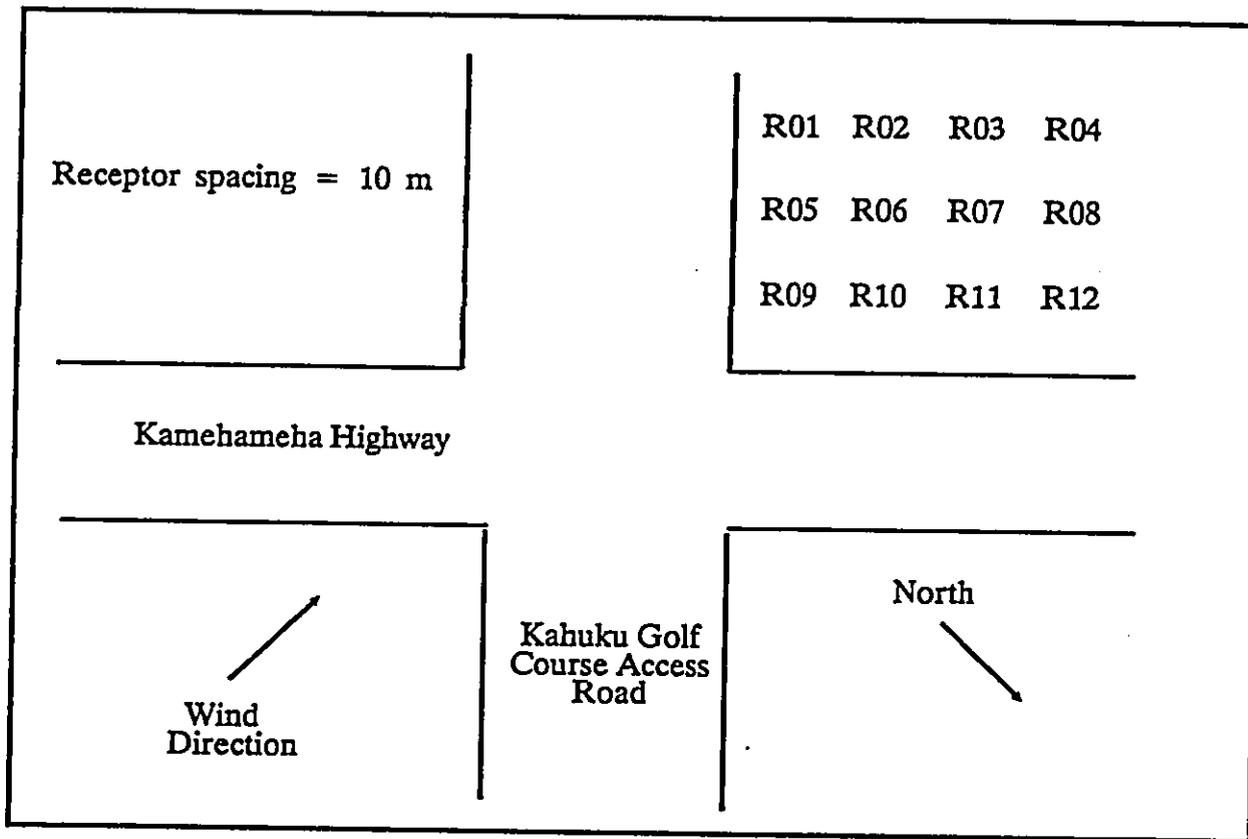


Receptor	Concentration (mg/m ³)		
	1989	1993 w/o proj	1993 w/proj
R01	2.6	2.7	2.7
R02	2.5	2.6	2.6
R03	2.4	2.5	2.6
R04	2.4	2.5	2.5
R05	3.0	3.1	3.2
R06	2.8	3.0	3.1
R07	2.7	2.8	3.0
R08	2.7	2.8	3.0
R09	3.5	3.8	3.8
R10	3.4	3.5	3.6
R11	3.3	3.5	3.6
R12	3.3	3.4	3.5

FIGURE 7

ESTIMATES OF MAXIMUM 8-HOUR
CARBON MONOXIDE CONCENTRATIONS

Kamehameha Highway at the Kahuku Golf Course Access Road
1989 - 1993



Receptor	Concentration (mg/m ³)		
	1989	1993 w/o proj	1993 w/proj
R01	1.6	1.6	1.6
R02	1.5	1.6	1.6
R03	1.4	1.5	1.6
R04	1.4	1.5	1.5
R05	1.8	1.8	1.9
R06	1.7	1.8	1.8
R07	1.6	1.7	1.8
R08	1.6	1.7	1.8
R09	2.1	2.3	2.3
R10	2.1	2.1	2.2
R11	2.0	2.1	2.2
R12	2.0	2.1	2.1

PROPOSED KAHUKU RESIDENTIAL

APPENDIX B

**BOTANICAL SURVEY, KAHUKU
RESIDENTIAL, KAHUKU, O'AHU**

Char & Associates

APPENDIX B

BOTANICAL SURVEY
KAHUKU RESIDENTIAL
KAHUKU, O'AHU

by

Winona P. Char
CHAR & ASSOCIATES
Botanical/Environmental Consultants
Honolulu, Hawai'i

Prepared for: WILLIAM E. WANKET, INC.
December 1989

EXECUTIVE SUMMARY

On 25 November 1989, a botanical survey was made of the proposed Kahuku Residential property, a ±16.3-acre site adjacent to Kahuku Village Makai. The general vegetation type is pastureland composed of dense mats of California grass with scattered koa-haole and Indian pluchea shrubs. Cattle and horses are present on the site. A line of mature trees, mostly ironwood, can be found along the perimeter of the property where it adjoins the village. A total of 51 species of vascular plants were found, of which 45 (88%) were introduced species and 1 (2%) Polynesian introduced. Only 5 (10%) were native or presumed-native species. These five are widespread throughout the islands and the Pacific; none are considered threatened or endangered.

Because the vegetation on the property is dominated by introduced plants and appears to have been grazed for some length of time, there is very little of botanical interest or concern on the subject property. The proposed residential development is not expected to have a significant negative impact on the botanical resources of the project site. It may be desirable to retain some of the larger trees as these add to the aesthetic value of the property and can also provide visual screening.

BOTANICAL SURVEY
KAHUKU RESIDENTIAL
KAHUKU, O'AHU

INTRODUCTION

The project site consists of approximately 16.3 acres of land in Kahuku, of which 11.3 acres are zoned "Agriculture" and 5.0 acres are zoned "Urban". It is bound on the west and south by Kahuku Village Makai; to the north by pasturelands; and to the east by pasturelands and the Kahuku golf course. A residential development is planned for the subject property.

On 25 November 1989, a field survey of the property was conducted. The primary objectives of the field study were to (1) provide a general description of the vegetation type; (2) inventory the flora; and (3) search for rare, threatened and endangered species.

A walk-through method was employed for this survey, with plants identified on sight. Plants which could not be positively identified were collected for later determination by comparison with known material in the herbarium (U. H., Manoa) and reference to standard taxonomic literature. Species recorded from the site in this survey reflect both the season of the field studies and the over-all environmental conditions. Surveys taken at different seasons of the year ("rainy" vs. "dry") would no doubt yield slightly different species composition, especially among the weedy annuals.

DESCRIPTION OF THE VEGETATION

The majority of the ±16.3-acre parcel is presently used for grazing cattle and horses. California grass (Brachiaria mutica),

1 to 3 ft. high, comprises the main foliage along with scattered shrubs of koa-haole (Leucaena leucocephala). Weedy Indian pluchea (Pluchea indica) shrubs, 3 to 5 ft. high, are also a common component of the pastureland. In general, the densely matted California grass tends to exclude many other species. Some other plants found here in smaller numbers include Bermuda grass (Cynodon dactylon), swollen finger grass (Chloris barbata), sleeping grass (Mimosa pudica var. unijuga), 'uhaloa (Waltheria indica), false mallow (Malvastrum coromandelianum), and crabgrass (Digitaria ciliaris).

Where the property adjoins Kahuku Village Makai, there is a line of trees along its perimeter. Trees here include ironwood (Casuarina equisetifolia), hau (Hibiscus tiliaceus), false kamani (Terminalia catappa), kiawe (Prosopis pallida), and sea grape (Coccoloba uvifera). Weedy species also occur in greater abundance along the periphery of the property as there is less grazing pressure and also less competition from the mats of California grass. Some plants found here include New Zealand spinach (Tetragonia tetragonioides), popolo (Solanum americanum), Chinese violet (Asystasia gangetica), 'aheahea (Chenopodium murale), spiny amaranth (Amaranthus spinosus), and hairy spurge (Chamaesyce hirta).

DISCUSSION AND RECOMMENDATIONS

A total of 51 plant species were inventoried on the site during the field studies (refer to species list at end of report). Of these 45 (88%) are introduced or alien species; 1 (2%) is originally of Polynesian introduction; and 5 (10%) are indigenous, i.e., native to the Hawaiian Islands and also elsewhere. No plants considered endemic, i.e., native only to the islands, were found. California grass along with scattered shrubs of koa-haole

and Indian pluchea, all introduced species, form the dominant vegetation on the site. The five native species on the site -- popolo, 'uhaloa, hau, kipukai, and 'akulikuli -- occur throughout the islands and the Pacific in similiar environmental habitats. Some, such as the 'uhaloa and popolo, are considered weedy natives as they prefer more open, disturbed areas.

There is very little of botanical interest on the subject property and the proposed development is not expected to have a significant negative impact on the state-wide status of any of the species involved. None are considered threatened or endangered (U. S. Fish and Wildlife Service 1985; Herbst 1987). A similar botanical survey (Char 1989) conducted on lands nearby also resulted in similiar findings.

Where feasible, it might be desirable to retain some of the larger trees along the boundaries of the property as these add to the aesthetic value of the property.

LITERATURE CITED

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- Herbst, D. 1987. Status of endangered Hawaiian plants. Hawaiian Botanical Society Newsletter 26(2): 44-45.
- Porter, J. R. 1972. Hawaiian names for vascular plants. Coll. of Tropical Agriculture, Hawaii Agricultural Experimental Station, Univ. of Hawaii, Dept. Paper No. 1. March 1972.
- St. John, H. 1973. List and summary of the flowering plants in the Hawaiian Islands. Pacific Tropical Botanical Garden Mem. No. 1, Lawai, Kaua'i.
- U. S. Fish and Wildlife Service, 1985. Endangered and threatened wildlife and plants; Review of plant taxa for listing as Endangered and Threatened Species; Notice of review. Federal Register 50(188): 39526-39527 plus 57-page table of species.
- Wagner, W. L., D. Herbst, and S. H. Sohmer. In press. Manual of the flowering plants of the Hawaiian Islands. B. P. Bishop Museum and Univ. of Hawaii Press, Honolulu.

PLANT SPECIES CHECKLIST -- 16-Acre Parcel at Kahuku

In the following species checklist, the plants are divided into two groups. Taxonomy and nomenclature of the two groups of flowering plants, Monocots and Dicots, are in accordance with Wagner et al. (in press). Common English names follow St. John (1973); Hawaiian names are in accordance with St. John or Porter (1972).

For each species, the following information is provided:

1. Scientific name with author citation.
2. Common English or Hawaiian name, when known.
3. Biogeographic status of a species. The following symbols are used:

I = indigenous = native to the Hawaiian Islands and also to one or more other geographic area(s)

P = Polynesian = plants of Polynesian introduction prior to Western contact (1778); not native

X = introduced or alien = all those plants brought here deliberately or accidentally after Western contact; not native.

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>STATUS</u>
MONOCOTS		
ARECACEAE (Palm Family) Cocos nucifera L.	coconut, niu	P
CYPERACEAE (Sedge Family) Cyperus rotundus L.	nutgrass, nut sedge	X
POACEAE (Grass Family) Brachiaria mutica (Forssk.) Stapf Chloris barbata (L.) Sw.	California grass swollen finger grass, mau'ulei	X X X
Chloris divaricata R. Br. Cenchrus echinatus L.	stargrass common sandbur, 'ume'alu	X X X
Cynodon dactylon (L.) Pers.	Bermuda grass, manienie	X X
Digitaria ciliaris (Retz.) Koeler Eleusine indica (L.) Gaertn. Panicum maximum var. trichoglume Eyles ex Robyns	crabgrass wire grass green panicgrass	X X X X
Setaria verticillata (L.) P. Beauv. Sorghum halpense (L.) Pers. Stenotaphrum secundatum (Walt.) Ktze.	bristly foxtail Johnson grass buffalo grass, St. Augustine grass	X X X X
DICOTS		
ACANTHACEAE (Acanthus Family) Asystasia gangetica (L.) T. Anderson	Chinese violet	X
AIZOACEAE (Ficaria-marigold Family) Sesuvium portulacastrum (L.) L.	'akulikuli, sea purslane	I X
Tetragonia tetragonioides (Pallas) Ktze.	New Zealand spinach	X
AMARANTHACEAE (Amaranth Family) Amaranthus spinosus L.	spiny amaranth, pakai kuku	X X
Amaranthus viridus L.	slender amaranth, pakai	X
ANACARDIACEAE (Mango Family) Schinus terebinthifolius Raddi	Christmas berry, wilelaiki	X

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>STATUS</u>
ASTERACEAE (Sunflower Family)		
<i>Bidens alba</i> var. <i>radiata</i> (Schultz-Bip.) Ballard ex Melchert	white-flowered beggar's tick	X
<i>Crassocephalum crepidioides</i> (Benth.) S. Moore	crassocephalum	X
<i>Pluchea indica</i> (L.) Less.	Indian pluchea	X
<i>Pluchea symphytifolia</i> (Mill.) Gillis	pluchea, sourbush	X
<i>Wedelia trilobata</i> (L.) Hitchc.	wedelia	X
<i>Xanthium strumarium</i> var. <i>canadense</i> (Mill.) Torr. & A. Gray	cocklebur	X
BASELLACEAE (Basella Family)		
<i>Androdera cordifolia</i> (Ten.) Steenis	Ceylon spinach	X
BORAGINACEAE (Heliotrope Family)		
<i>Heliotropium curassavicum</i> L.	kipukai, nena	I
BRASSICACEAE (Mustard Family)		
<i>Lepidium virginicum</i> L.	lepidium, peppergrass	X
CASUARINACEAE (Casuarina Family)		
<i>Casuarina equisetifolia</i> L.	common ironwood	X
CHENOPODIACEAE (Goosefoot Family)		
<i>Atriplex semibaccata</i> R. Br.	Australian saltbush	X
<i>Chenopodium murale</i> L.	'aheahea	X
COMBRETACEAE (Combretum Family)		
<i>Terminalia catappa</i> L.	false kamani, Chinese almond	X
EUPHORBIACEAE (Spurge Family)		
<i>Chamaesyce hirta</i> (L.) Millsp.	hairy spurge, garden spurge	X
<i>Euphorbia heterophylla</i> L.	fire plant	X
<i>Ricinus communis</i> L.	castor bean	X
FABACEAE (Pea Family)		
<i>Desmanthus virgatus</i> (L.) Willd.	slender mimosa	X
<i>Leucaena leucocephala</i> (Lam.) de Wit	koa-haole	X
<i>Mimosa pudica</i> var. <i>unijuga</i> (Duchass. & Walp.) Griseb.	sensitive plant, sleeping grass, puahilahila	X
<i>Prosopis pallida</i> (Humb. & Bonpl. ex Willd.) Kunth	kiawe	X

<u>SCIENTIFIC NAME</u>	<u>COMMON NAME</u>	<u>STATUS</u>
MALVACEAE (Mallow Family)		
Hibiscus tiliaceus L.	hau	I?
Malvastrum coromandelianum (L.) Garcke	false mallow, hauuoi	X
MORACEAE (Mulberry Family)		
Ficus microcarpa L. f.	Chinese banyan	X
PASSIFLORACEAE (Passion Flower Family)		
Passiflora foetida L.	red-fruited passion flower, pohapoha	X
PLANTAGINACEAE (Plantain Family)		
Plantago lanceolata L.	narrow-leaved plantain	X
POLYGONACEAE (Buckwheat Family)		
Coccoloba uvifera (L.) L.	sea grape	X
PORTULACACEAE (Purslane Family)		
Portulaca oleracea L.	pigweed	X
Portulaca pilosa L.	'ihi	X
SOLANACEAE (Tomato Family)		
Lycopersicon pimpinellifolium (Jusl.) Mill.	wild tomato, currant tomato	
Solanum americanum Mill.	popolo	I?
STERCULIACEAE (Cocoa Family)		
Waltheria indica L.	'uhaloa, hi'aloa	I?
VERBENACEAE (Verbena Family)		
Lantana camara L.	lantana, lakana	X
Vitex trifolia var. subtrisecta (Ktze.) Mold.	vitex, polinalina	X

PROPOSED KAHUKU RESIDENTIAL

APPENDIX C

**PROPOSED KAHUKU RESIDENTIAL
PROJECT: IMPACT ON
AGRICULTURE**

Decision Analysts Hawaii, Inc.

APPENDIX C

**KAHUKU RESIDENTIAL:
IMPACT ON AGRICULTURE**

PREPARED FOR:

The Estate of James Campbell

PREPARED BY:

Decision Analysts Hawaii, Inc.

December 1989

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EXECUTIVE SUMMARY

The Kahuku Residential project is a subdivision proposed for 16.3 acres of land located a short distance north of the old Kahuku Sugar Mill and west of the Kahuku Golf Course. Of this land, 11.3 acres are in the State Agricultural District and 5 acres are in the State Urban District.

Currently, the majority of the property is used for grazing horses. In order to continue grazing operations, other lands in the Kahuku area could be made available by The Estate of James Campbell.

Regarding diversified agriculture, the affected lands are poorly suited for crop production as indicated by relatively poor soils, lack of water, exposure to strong winds and salt spray, and proximity to nearby homes. Furthermore, the acreage involved is too small to adversely affect the growth of diversified agriculture, particularly in view of the large amount of land that has been released from plantation agriculture and which remains available for diversified agriculture.

Finally, the Kahuku Residential project is consistent with the agricultural portion of the *Hawaii State Plan*, the *State Agriculture Functional Plan*, and the *General Plan of the City and County of Honolulu*. This thrust in all three plans calls for preserving the economic viability of plantation agriculture and promoting the growth of diversified agriculture. To accomplish this, an adequate supply of agriculturally suitable land and water must be assured by protecting high-quality agricultural lands from development. However, marginal or non-essential agricultural lands would be made available for appropriate urban uses. The Kahuku Residential project would not adversely affect the economic viability of plantation agriculture since no plantation lands are involved, and would not adversely affect the growth of diversified agriculture. Furthermore, the lands involved are lower-quality agricultural lands suitable for urban uses.

Finally, the project would contribute in a small way to the State's pressing need for housing.

PROPOSED KAHUKU RESIDENTIAL PROJECT: IMPACT ON AGRICULTURE

The Kahuku Residential project is a subdivision proposed for 16.3 acres of land located a short distance north of the old Kahuku Sugar Mill and west of the Kahuku Golf Course. Of this land, 11.3 acres are in the State Agricultural District and 5 acres are in the State Urban District. The impact of the proposed Kahuku Residential project on agriculture is discussed below.

AGRONOMICAL CONDITIONS

Soil Types and Agricultural Uses

The affected acreage consists of two soil types.⁽¹⁾ The predominate soil type, which comprises about 85 percent of the project area, is JaC, "Jaucas sand," which has slopes of 0 to 15 percent. The other soil type, KmbA, "Keaau clay, saline," comprises about 15 percent of the area and has slopes of 0 to 2 percent. JaC can be used for pasture, sugarcane and truck crops, while KmbA can be used for pasture.

Soil Ratings

The soils within the petition area have been rated in terms of four classification systems commonly used in Hawaii: (1) Land Capability Grouping, (2) Agricultural Lands of Importance to the State of Hawaii, (3) Overall Productivity Rating, and (4) Proposed Land Evaluation and Site Assessment. These classification systems are discussed below.

- (1) *Land Capability Grouping by the United States Department of Agriculture Soil Conservation Service (SCS).*

The SCS classification system rates soils at eight levels, ranging from the highest classification level, "I," to the lowest level, "VIII." The JaC soils, which take up about 85 percent of the project area, are rated IVs when irrigated, which indicates that they have very severe limitations that reduce the choice of plants, re-

quire very careful management, or both. These limitations are due to stoniness, shallowness, unfavorable texture, or low water-holding capacity. The KmbA soils, which comprise the remaining 15 percent of the area, are rated VIw. The VI rating indicates that the soils have severe limitations that make them generally unsuited for cultivation and limit their use to pasture or range, woodland, or wildlife habitat, while the "w" indicates that the soils are severely limited by excess water.

- (2) *Agricultural Lands of Importance in the State of Hawaii (ALISH)*, by the SCS, University of Hawaii (UH) College of Tropical Agriculture and Human Resources, and the State of Hawaii, Department of Agriculture.^[2]

This system classifies lands into three categories: (a) "Prime" agricultural land which is land that is best-suited for the production of crops because of its ability to sustain high yields with relatively little input and with the least damage to the environment; (b) "Unique" agricultural land which is non-prime agricultural land that is currently used for the production of specific high-value crops; and (c) "Other" agricultural land which is non-prime and non-unique agricultural land that is of importance to the production of crops.

About 85 percent of the land proposed for the Kahuku Residential project is not rated by ALISH, while the remaining land is rated "Other" agricultural land.

- (3) *Overall Productivity Rating*, by the UH Land Study Bureau (LSB).^[3]

This classification rates soils according to five levels, where "A" represents the class of highest productivity and "E" the lowest. All soils in the project area are rated B.

- (4) *Proposed Land Evaluation and Site Assessment (LESA) System*, by the State of Hawaii Land Evaluation and Site Assessment Commission.^[4]

Based on soil quality, locational attributes, improvements, nearby activities, and land-use plans, this proposed classification system attempts to designate a sufficient amount of the better agricultural lands to meet projected agricultural goals. If the LESA classification approach were applied to this project site, none of the site would be termed "important agricultural lands" (IAL), since they must have a rating of 66 or above out of a possible total of 100. The ratings for JaC and KmbA are 41 and 24, respectively.

Based on the various soil surveys, the project site has relatively poor soils for crop production.

Other Agronomical Conditions^[5]

The subject property is on a plain near sea level, and rainfall ranges between 40 and 50 inches per year. Water for agricultural use has not been available on the land since the Kahuku plantation water system was shut down in 1971. Heavy onshore tradewinds and accompanying salt spray limit the choice of crops. Also, the property abuts and is upwind of an existing housing development. Consequently, the area is unsuited for agricultural activities that would generate a significant amount of noise, dust, smoke, and/or airborne chemicals.

Past and Current Agricultural Uses of the Property

Until 1971, the property was part of Kahuku Plantation Company, although sugarcane was *not* cultivated on the property.^[6] About 50 years ago, produce farming took place on a portion of the land.

Currently, the majority of the property is used for grazing horses. In order to continue grazing operations, other lands in the Kahuku area could be made available by The Estate of James Campbell (Campbell Estate).

SUPPLY OF PRIME AGRICULTURAL LAND

An enormous and growing supply of prime agricultural land is available for diversified agriculture, and more will soon be available. In the Kahuku area, the State is developing the Kahuku Agricultural Park, which will have 220 usable acres of land divided into 24 lots, under a 30-year lease from Campbell Estate. Lands will be available for nursery products, truck crops, and orchards.^[2]

From a broader perspective, about 90,000 acres of Hawaii's prime agricultural land have been freed from sugar and pineapple production since 1968: about 62,700 acres of land freed from sugar production (about 15,200 acres on Oahu and 47,500 on the Neighbor Islands), and about 27,300 acres freed from pineapple production (about 6,600 acres on Oahu and 20,700 on the Neighbor Islands).^[7-9] Some of these lands include fields which were farmed by Kahuku Plantation Company, but which are now fallow. In addition, Hamakua Sugar Co., Inc. has announced that it will sell up to 9,000 acres of land on the Big Island in order to reduce its debt, and Ka'u Agribusiness Co., Inc. has announced that it will contract operations by 4,200 acres.

Some of the land which has freed from sugar and pineapple production has been or will be converted to urban, diversified agriculture, and aquaculture uses. After making allowances for these conversions, uncommitted acreage which remains available to diversified agriculture and aquaculture amounts to many tens of thousands of acres, with a significant portion of this in the Kahuku area. Much of this land is fallow, in pasture, or in some other low-value land-holding operation.

The Statewide supply of prime agricultural land probably will increase given the very real possibility of future sugar plantation closings. A number of Hawaii's sugar plantations are unprofitable but remain in operation today only because they are committed to lease and/or energy contracts which make closing prohibitively expensive. However, these contracts eventually will end.

Furthermore, a portion of the sugarcane land is in a holding pattern awaiting the discovery of profitable replacement activities; this land forms part of the supply of prime agricultural land available to profitable diversified agriculture crops.

Many of the lands freed, to be freed, or which can be freed from sugar and pineapple production have excellent agricultural qualities and climatic conditions, and are well-suited for a variety of crops. Also, water is available for most of these lands, particularly those lands which have been freed from sugar production.

Additional lands which have been made available for diversified agriculture are in government-sponsored agricultural parks in other parts of the State. Lands for agricultural activities which do not require prime agricultural land include pasture land, land for livestock operations, and "unique" lands as classified by ALISH (see page 2). Unique lands are not prime agricultural lands, but are important lands for certain crops, the principal examples are the coffee lands in Kona, and certain lava lands in Puna that are particularly well-suited for growing papaya. The supply of pasture lands, lands for livestock, and unique lands is quite large and is distinct from the supply of prime agricultural lands.

IMPACT ON THE GROWTH OF DIVERSIFIED AGRICULTURE

The development of the Kahuku Residential project represents a commitment of 11.3 acres of agricultural land to residential use; the remaining 5 acres of the project area are already in the State Urban District. As discussed above, the affected lands are poorly suited for crop production as indicated by relatively poor soils, lack of water, exposure to strong winds and salt spray, and proximity to nearby homes. Furthermore, the acreage involved is too small to adversely affect the growth of diversified agriculture, particularly in view of the large amount of land that has been released from plantation agriculture and which remains available for diversified agriculture.

CONSISTENCY WITH STATE AND COUNTY PLANS

The Kahuku Residential project is consistent with the agricultural portion of the *Hawaii State Plan*, the *State Agriculture Functional Plan*, and the *General Plan of the City and County of Honolulu*. This thrust in all three plans calls for preserving the economic viability of

plantation agriculture and promoting the growth of diversified agriculture (see Table 1). To accomplish this, an adequate supply of agriculturally suitable land and water must be assured by protecting high-quality agricultural lands from development. However, marginal or non-essential agricultural lands would be made available for appropriate urban uses.

The Kahuku Residential project would not adversely affect the economic viability of plantation agriculture since no sugarcane or pineapple lands are involved and, as discussed above, would not adversely affect the growth of diversified agriculture. Furthermore, the lands involved are lower-quality agricultural lands suitable for urban uses.

Finally, the project would contribute in a small way to the State's pressing need for housing.

Table 1.-- SELECTED STATE AND COUNTY OBJECTIVES,
POLICIES, AND GUIDELINES RELATED
TO AGRICULTURAL LANDS

HAWAII STATE PLAN (Chapter 226, Hawaii Revised Statutes, as amended):

Section 226-7 Objectives and policies for the economy--agriculture.

- (a) Planning for the State's economy with regard to agriculture shall be directed towards achievement of the following objectives:
 - (1) Continued viability in Hawaii's sugar and pineapple industries.
 - (2) Continued growth and development of diversified agriculture throughout the State.
- (b) To achieve the agricultural objectives, it shall be the policy of the State to:
 - (6) Assure the availability of agriculturally suitable lands with adequate water to accommodate present and future needs.

Section 226-103 Economic priority guidelines.

- (c) Priority guidelines to promote the continued viability of the sugar and pineapple industries:
 - (1) Provide adequate agricultural lands to support the economic viability of the sugar and pineapple industries.
- (d) Priority guidelines to promote the growth and development of diversified agriculture and aquaculture:
 - (1) Identify, conserve, and protect agricultural and aquacultural lands of importance and initiate affirmative and comprehensive programs to promote economically productive agricultural and aquacultural uses of such lands.

Section 226-104 Population growth and land resources priority guidelines.

- (b) Priority guidelines for regional growth distribution and land resource utilization:
 - (2) Make available marginal or non-essential agricultural lands for appropriate urban uses while maintaining agricultural lands of importance in the agricultural district.

Table 1.-- SELECTED STATE AND COUNTY OBJECTIVES,
POLICIES, AND GUIDELINES RELATED
TO AGRICULTURAL LANDS
(continued)

STATE AGRICULTURAL FUNCTIONAL PLAN (June 1985)

(Functional plans are guidelines for implementing the State Plan, and are not adopted by the State Legislature.)

B. Objective: Achievement of Productive Agricultural Use of Lands Most Suitable and Needed for Agriculture.

(5) Policy: Provide greater protection to agricultural lands in accordance with the Hawaii State Constitution.

(c) Implementing Action: Identify important agricultural lands to promote diversified agriculture, increased agricultural self-sufficiency, and assure the availability of agriculturally suitable lands.

(d) Implementing Action: Until standards and criteria to conserve and protect important agricultural lands are enacted by the Legislature, important agricultural lands should be classified in the State Agricultural District and zoned for agricultural use, except where, by the preponderance of the evidence presented, injustice or inequity will result or overriding public interest exists to provide such lands for other objectives of the Hawaii State plan.

**CITY AND COUNTY OF HONOLULU
GENERAL PLAN, Objectives and Policies (Resolution No. 82-188)**

Economic Activity

Objective C. To maintain the viability of agriculture on Oahu.

Policy 4. Provide sufficient agricultural land in Ewa, Central Oahu, and the North Shore to encourage the continuation of sugar and pineapple as viable industries.

Policy 5. Maintain agricultural land along the Windward, North Shore, and Waianae coasts for truck farming, flower growing, aquaculture, livestock production, and other types of diversified agriculture.

REFERENCES

- [1] U.S. Department of Agriculture, Soil Conservation Service in cooperation with The University of Hawaii Agricultural Experiment Station, *Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai*, State of Hawaii, Washington, D.C., August 1972.
- [2] Wilson Okamoto & Associates, *Agricultural Feasibility Analysis Report for the Kahuku Agricultural Park*, November 1984.
- [3] Land Study Bureau, *Detailed Land Classification—Island of Oahu*, University of Hawaii, Honolulu, Hawaii, December 1972.
- [4] State of Hawaii Land Evaluation and Site Assessment Commission, *A Report on the State of Hawaii Land Evaluation and Site Assessment System*, Legislative Reference Bureau, Honolulu, Hawaii, February 1984.
- [5] Wilson Okamoto & Associates, Inc., *Revised Environmental Impact Statement, Kahuku Agricultural Park*, May 1984.
- [6] Campbell Estate.
- [7] Hawaiian Sugar Planters' Association, *Hawaiian Sugar Manual 1988*.
- [8] Hawaii Agricultural Statistics Service, *Statistics of Hawaiian Agriculture 1987*.
- [9] Robert C. Schmitt, *Historical Statistics of Hawaii*.

PROPOSED KAHUKU RESIDENTIAL

APPENDIX D

**TRAFFIC IMPACT ASSESSMENT
REPORT FOR KAHUKU
RESIDENTIAL SUBDIVISION**

Pacific Planing & Engineering, Inc.

APPENDIX D

TRAFFIC IMPACT ASSESSMENT REPORT

for

KAHUKU RESIDENTIAL SUBDIVISION

Kahuku, Hawaii
TMK: 5-6-02: Por. 16

December 1989

Prepared for:

Estate of James Campbell

Prepared by:

Pacific Planning & Engineering, Inc.
1144 Tenth Avenue, Suite 202
Honolulu, Hawaii 96816

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EXECUTIVE SUMMARY

Pacific Planning & Engineering, Inc. (PPE) was engaged to undertake a study to identify and assess future traffic impacts of a proposed Kahuku Residential Subdivision. This report presents the findings and recommendations of the traffic study.

The study focuses on the intersections of Kamehameha Highway and Road "A" and Road "B" which provide access to the project from all directions. This traffic impact report identifies and evaluates the probable impact of project generated traffic by comparing traffic conditions with and without the project traffic. This report assesses traffic impacts during the weekday and weekend afternoon peak hours.

Project Description

The Estate of James Campbell is proposing to construct the Kahuku Residential Subdivision. The project location and roadway network in its vicinity are shown in Figure 1 on page 5. The project site is located in Kahuku Town, near the Kahuku Sugar Mill, between Kamehameha Highway and the Pacific Ocean. The project site consists of 16.3 acres of land that is presently vacant.

The project will consist of 87 single family dwellings that will be located adjacent to the planned Kahuku Village Makai Subdivision. Figure 2 on page 6 shows the site plan and access roads for the project. The primary accesses to the project will be Road "A" and Road "B" which connects the project to Kamehameha Highway. Construction for the project is expected to be completed in 1992 with full occupancy by 1993. The market for the development is expected to be primarily local residents.

Existing Conditions

The land use immediately surrounding the project site is generally a mixture of recreational uses, commercial uses, public facilities, and single family dwellings. North of the project is the Pacific Ocean and to the west is the Kahuku Golf Course. To the south is the proposed Kahuku Village Makai Subdivision and the Kahuku Sugar Mill which is a shopping center. Further south past Kamehameha Highway is the Kahuku High School, the fire and police station. West of the project is bordered by the Kahuku Village Makai Subdivision.

Vehicular access to the proposed development will be from Kamehameha Highway which is the only highway in the area providing for through traffic along the North Shore of Oahu. It is a State maintained highway with a 50 foot right-of-way and a 20 foot wide pavement in the vicinity of the project. There is on 10 foot wide lane in each direction. The posted speed of Kamehameha Highway in the project vicinity is 35 miles per hour.

Road "A" is a private road with a pavement width of 20 feet. It provides access to the Kahuku Sugar Mill and residences. The intersection of Kamehameha Highway with Road "A" is a "T"-intersection. Road "B" is a private road with a pavement width of 20 feet. It provides access to the Kahuku Golf Course and residences. The intersection of Kamehameha Highway with Road "B" forms a cross-intersection with Kahuku High School driveway as the fourth leg.

Future Conditions

Future land uses in the immediate area that would affect future traffic conditions were identified. Among the major planned developments that have been approved are the Turtle Bay Resort and the Kahuku Village Makai Subdivision. By the year 1993, the resort is planning to build 1000 additional hotel units, 20,000 square feet of gross leasable commercial area and an 18 hole golf course. The proposed Kahuku Village Makai

Subdivision consists of 177 units of single family dwellings. The Village Subdivision is anticipated to be completed and fully occupied by 1993.

Conclusions

The proposed Kahuku Residential Subdivision will not significantly impact the traffic flow on Kamehameha Highway in 1993 when the project is expected to be completed.

The results of the analysis show that the project will cause *little or no delay* (LOS A) to traffic along Kamehameha Highway during the weekday and weekend afternoon peak hours. The left turn traffic into Road "A" and Road "B" from Kamehameha Highway will remain at LOS A *without or with* the project traffic.

By 1993 *even without the project*, the LOS for vehicles attempting to exit Road "A" and "B" onto Kamehameha Highway will operate with long delays during the weekday and weekend afternoon peak hours. Vehicles exiting Road "A" and "B" will operate at LOS E and LOS D, respectively. This increased delay is due in part to an increase in traffic along Kamehameha Highway as well traffic generated from the proposed Kahuku Village Makai Subdivision.

With the project, the LOS for the vehicles attempting to exit Road "A" onto Kamehameha Highway will worsen. The LOS for vehicles exiting Road "A" will drop from LOS E to LOS F during the weekend, but remain at LOS E during the weekday. The LOS for vehicles exiting Road "B" will remain at LOS D for the weekday and weekend afternoon peak hours. The delays for drivers exiting Road "A" and "B" are expected only during the peak hours.

To minimize the impact of the project, we recommend that exclusive right and left-turn lanes be provided along Road "A" for traffic exiting onto Kamehameha Highway. This

will permit drivers attempting right turns to bypass the left turning vehicles and decrease delays for vehicles attempting right turns.

Other developments such as the proposed Kahuku Villages Makai Subdivision will generate a substantial amount of traffic along Road "A" that will also benefit from the exclusive right and left-turn lanes. The traffic generated by the Kahuku Residential Subdivision makes up about 35% (87 vehicles) of the total traffic along Road "A" and 6% (9 vehicles) of the total traffic along Road "B". The traffic generated by the adjacent Kahuku Villages Makai Subdivision will make up about 42% (104 vehicles) of the total traffic along Road "A" and 46% (70 vehicles) of the total traffic along Road "B".

PROJECT DESCRIPTION

The Estate of James Campbell is proposing to construct the Kahuku Residential Subdivision. The project location and roadway network in its vicinity are shown in Figure 1. The project site is located in Kahuku Town, near the Kahuku Sugar Mill, between Kamehameha Highway and the Pacific Ocean. The project site consists of 16.3 acres of land that is presently vacant.

The project will consist of 87 single family dwellings that will be located adjacent to the planned Kahuku Village Makai Subdivision. Figure 2 shows the site plan and access roads for the project. The primary accesses to the project will be Road "A" and Road "B" which connects the project to Kamehameha Highway.

Construction for the project is expected to be completed in 1992 with full occupancy by 1993. The market for the development is expected to be primarily local residents.

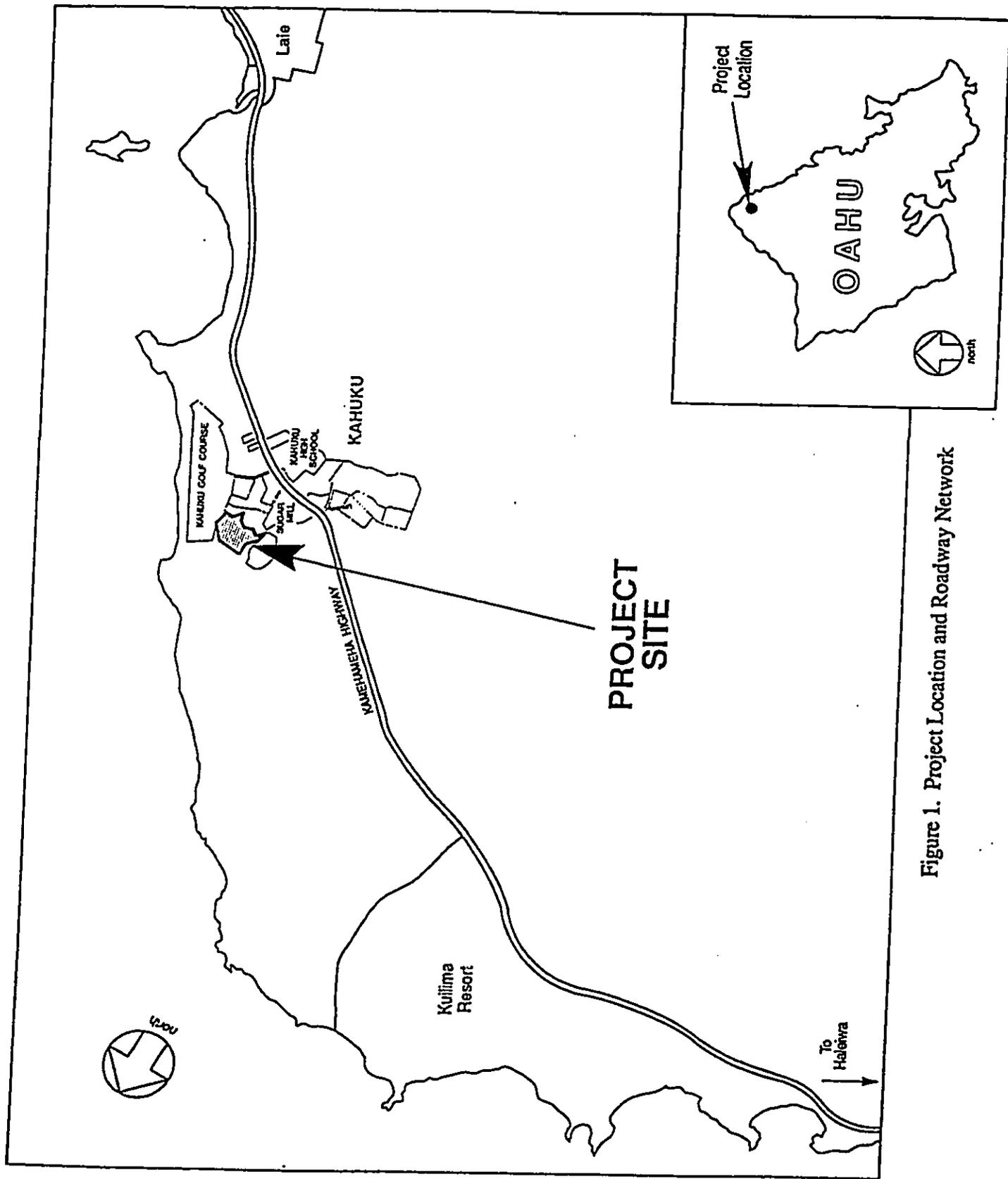


Figure 1. Project Location and Roadway Network

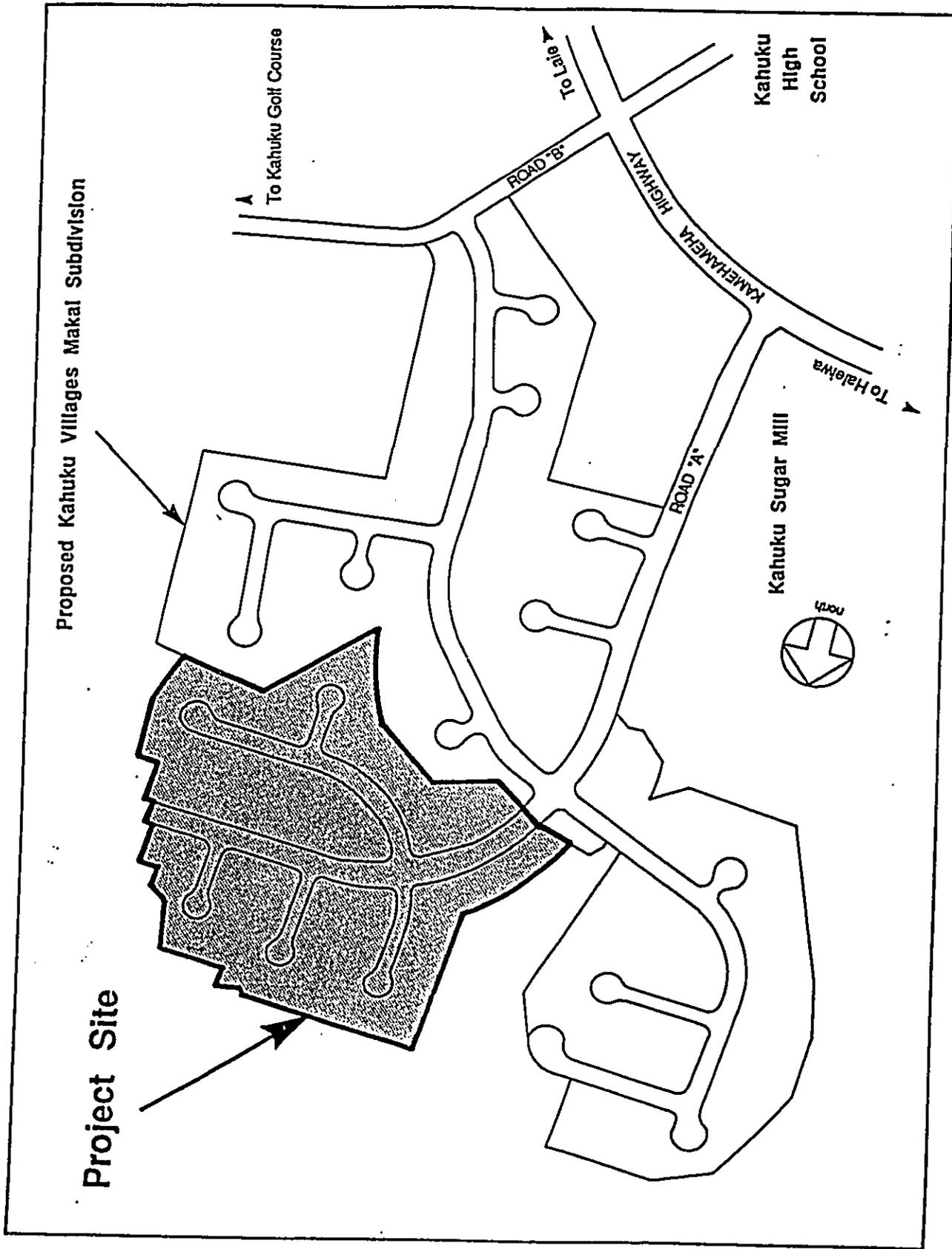


Figure 2. Project Site Plan

AREA CONDITIONS

A survey of existing conditions was conducted to better understand the traffic impact of the proposed project. The survey included the land use of the area, roadway facilities in the area and existing traffic conditions.

Existing Land Uses

The land use immediately surrounding the project site is generally a mixture of recreational uses, commercial uses, public facilities, and single family dwellings. North of the project is the Pacific Ocean and to the west is the Kahuku Golf Course. To the south is the proposed Kahuku Village Makai Subdivision and the Kahuku Sugar Mill which is a shopping center. Further south past Kamehameha Highway is the Kahuku High School, the fire and police station. West of the project is bordered by the Kahuku Village Makai Subdivision.

Roadway Facilities

Vehicular access to the proposed development will be from Kamehameha Highway which is the only highway in the area providing for through traffic along the North Shore of Oahu.

Kamehameha Highway is a rural arterial highway connecting major population centers along the North Shore such as Haleiwa, Kahuku, and Laie. It is a State maintained highway with a 50 foot right-of-way and a 20 foot wide pavement in the vicinity of the project. There is on 10 foot wide lane in each direction. The shoulders are grassed or dirt and vehicles park along both sides of the road. The posted speed of Kamehameha Highway in the project vicinity is 35 miles per hour.

Road "A" is a private road with a pavement width of 20 feet. It provides access to the Kahuku Sugar Mill and residences. The intersection of Kamehameha Highway with Road "A" is a "T"-intersection.

Road "B" is a private road with a pavement width of 20 feet. It provides access to the Kahuku Golf Course and residences. The intersection of Kamehameha Highway with Road "B" forms a cross-intersection with Kahuku High School driveway as the fourth leg.

Traffic Conditions

Traffic volume data from the State Department of Transportation (DOT) were used to determine traffic trends on Kamehameha Highway. Figure 3 summarizes the trend in Average Daily Traffic (ADT) along Kamehameha Highway near the Kahuku Sugar Mill (Sta. 26-F) and Laie (26-A). The plotted data show a steady increase in traffic growth on the order of 1.6% per year at Kahuku and 3.1% per year at Laie. The trend lines were estimated using linear regression analysis. These rates were averaged to come out with an estimated 2.5% per year growth rate near the project site.

Traffic counts along Kamehameha Highway taken over a 24 hour period were obtained from the DOT. The State counts indicated that the afternoon peak hour is the heaviest traffic period of the day. Generally, the afternoon peak hour occurs from 1:30 to 2:30 pm on a weekday and from 2:00 to 3:00 pm on the weekend. Weekend traffic is heavier than the weekday traffic.

Manual traffic counts were conducted during the weekday and weekend afternoon peak periods on December 2 & 6, 1989, at the intersections of Kamehameha Highway with Roads "A" and "B". During the manual counts, the weather was clear and the pavement was dry. A summary of the traffic counts for the observed afternoon peak hours are shown in Figures 4 and 5. Manual traffic count data is shown in Appendix B.

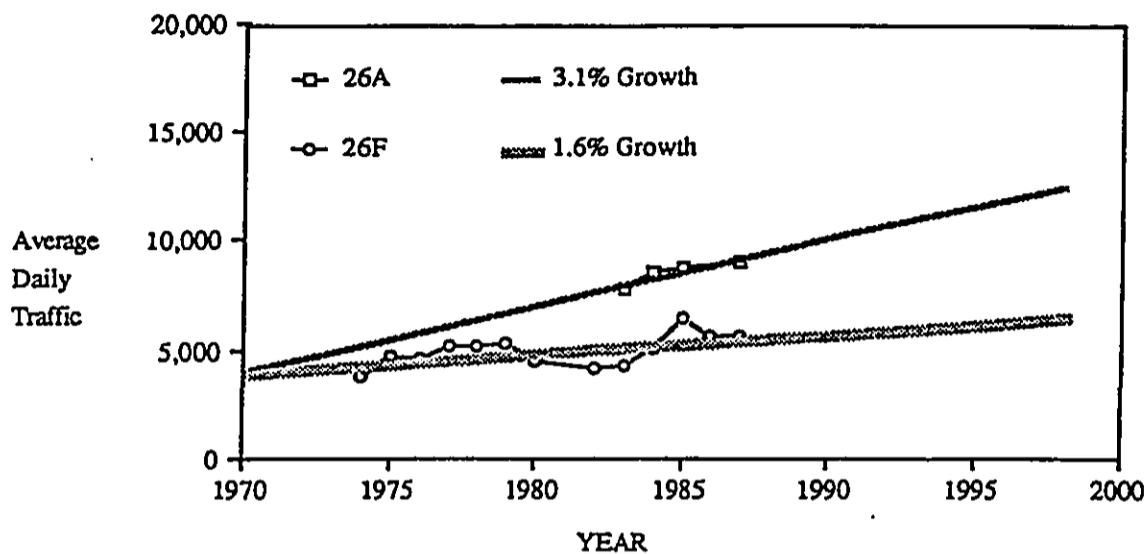


Figure 3. Historical Traffic Growth Trend on Kamehameha Highway

Manual counts were taken of passenger cars, trucks, buses, and motorcycles by turning movements and approaches to the study intersection during these periods. The survey was conducted to establish a baseline condition to compare against future traffic.

Observed Traffic Conditions

The following observations were made during the field survey:

1. A line of vehicles formed in behind slower moving vehicles such as buses, which created gaps for vehicles to exit onto Kamehameha Highway.
2. The area around the makai approach of the Road "B" intersection with Kamehameha Highway is paved and wide enough for drivers to bypass vehicles attempting left turns.
3. Drivers would pass vehicles turning left into Road "A" on the shoulder of Kamehameha Highway.

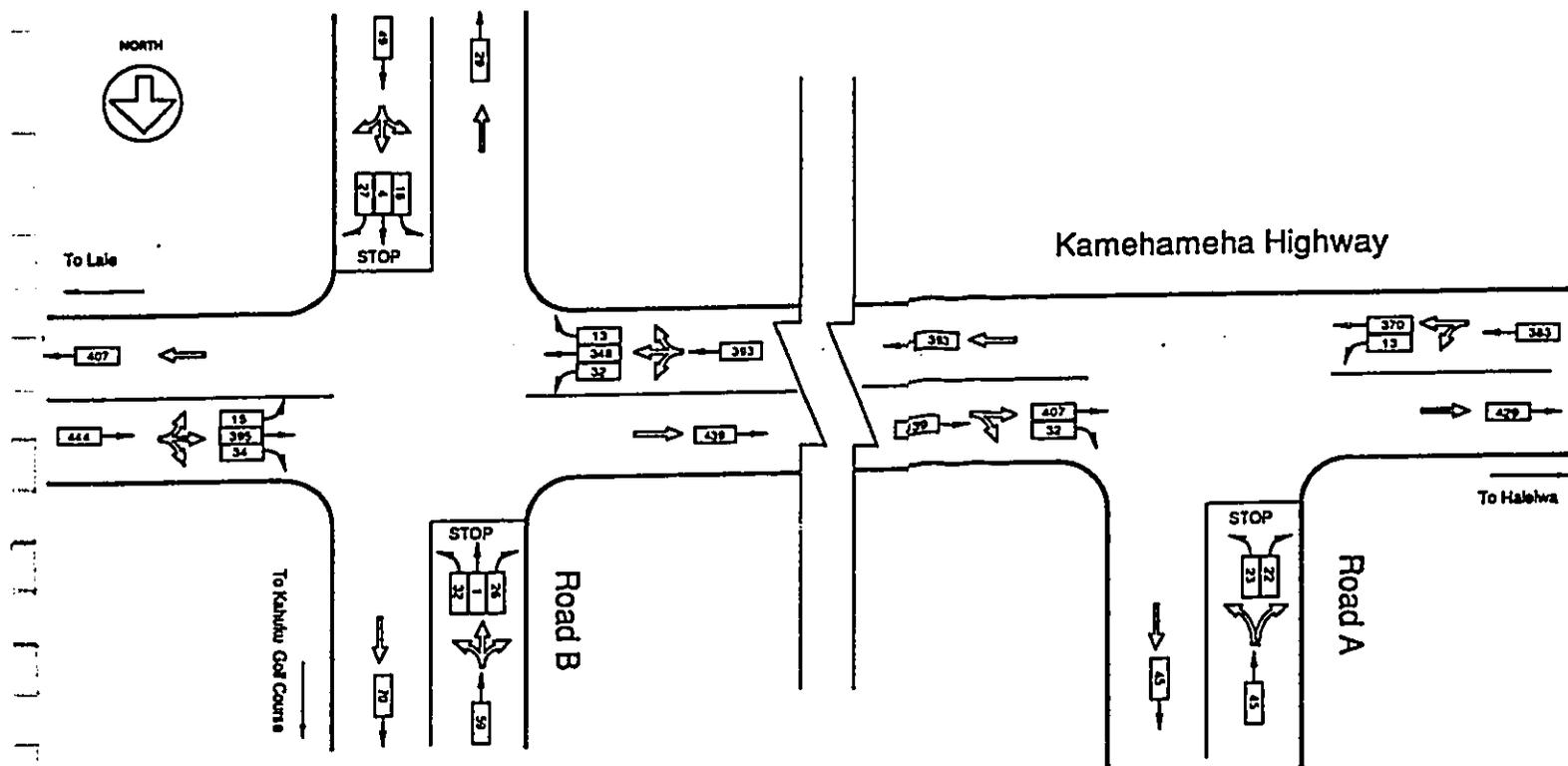


Figure 4. Existing Traffic Volumes 1989 Afternoon Peak Hour
 Kamehameha Highway with Roads "A" and "B"
 Weekday 1:30-2:30 PM

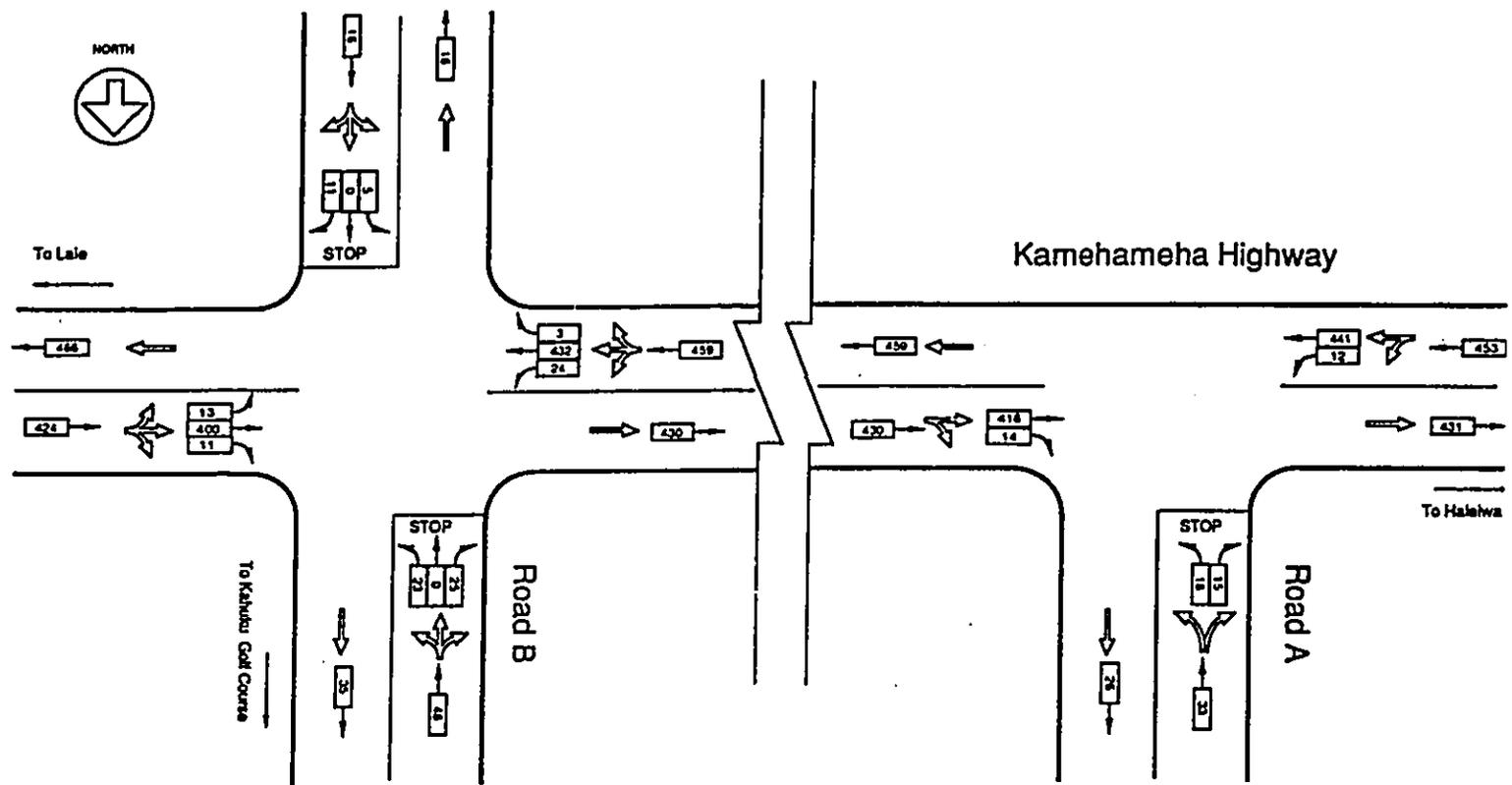


Figure 5. Existing Traffic Volumes 1989 Afternoon Peak Hour
 Kamehameha Highway with Roads "A" and "B"
 Weekend 2:00-3:00 PM

FUTURE CONDITIONS

Future Land Uses

Future land uses in the immediate area that would affect future traffic conditions were identified. Among the major planned developments that have been approved are the Turtle Bay Resort and the Kahuku Village Makai Subdivision.

The expansion of the Turtle Bay Resort is expected to contribute to an increase in ambient traffic along Kamehameha Highway. By the year 1993, the resort is planning to build 1000 additional hotel units, 20,000 square feet of gross leasable commercial area and an 18 hole golf course. It is important to note the resort development schedule is subject to change. Additional development at Turtle Bay is planned beyond 1993.

The proposed Kahuku Village Makai Subdivision will directly impact the project since it will use the same access roads to get to Kamehameha Highway. This development consists of 177 units of single family dwellings. The Village Subdivision is anticipated to be completed and fully occupied by 1993.

Future Roadway Facilities

At this time, there are no plans by the State DOT to improve Kamehameha Highway in the vicinity of the project.

PROJECTED TRAFFIC CONDITIONS

Future traffic forecasts without and with the project were estimated for the year 1993, when the project is expected to be fully occupied.

Future Ambient Traffic

Ambient traffic is the traffic which would occur even if the proposed project was not built. Ambient traffic is forecasted by increasing the existing through traffic volumes along Kamehameha Highway by the traffic growth rate and adding traffic generated by developments within the immediate area.

Traffic Growth along Kamehameha Highway

Traffic counts by the State Department of Transportation shows that average daily traffic has been increasing by about 2.5% annually, as discussed in the section on "Existing Conditions." The growth rate on Kamehameha Highway generally reflects traffic increase from developments outside the study area and tourist related traffic. The existing peak hour through traffic volumes, shown in Figures 4 and 5, were increased by 10% (2.5% for four years) to obtain the ambient traffic forecast volumes in 1993.

Traffic from Other Developments

The three-step procedure of trip generation, trip distribution, and traffic assignment was used to forecast future peak hour traffic from other developments in the immediate area.

The trip generation step calculates the number of trips which would be generated during the weekday and weekend afternoon peak hours by the other developments in the area.

The number of trips from the Kahuku Village Makai Subdivision were calculated from the ITE Trip Generation Report (Fourth Edition, 1987) for the 177 single family units. The number of trips from the Turtle Bay Expansion was calculated using average trip rates from the Austin Tsutsumi & Associates (ATA) traffic impact assessment report for the Turtle Bay Resort, dated 1985.

Table 1 shows the trip rates derived from ITE data and ATA trip rates and the number of trips generated by the proposed land uses during the weekday and weekend afternoon peak hours.

The trip distribution and traffic assignment steps allocate the generated trips to the different directions of travel and specific turning movements on the roadway. The trip distribution and traffic assignment for Turtle Bay was based on the ATA report. The existing travel patterns were used to distribute the traffic generated from the Kahuku Villages Subdivision.

The volumes derived from increasing through traffic by the historical growth rate were added to the traffic generated by future developments in the area. The resultant ambient traffic volumes are shown in Figures 6 and 7.

Table 1. Trip Generation

<u>Land Use</u>	<u>Rate</u>	<u>Trip Rates</u>			
		<u>Weekday Afternoon</u>		<u>Weekend Afternoon</u>	
		<u>Enter</u>	<u>Exit</u>	<u>Enter</u>	<u>Exit</u>
Hotel ¹	Trip/Room	0.14	0.15	0.14	0.13
Shopping Center ¹	Trip/1000 sf	2.74	2.81	1.28	3.90
Golf Course ²	Trip/Acre	0.18	0.33	0.18	0.33
Kahuku Villages ²	Trip/Dwelling	0.67	0.38	0.52	0.46

<u>Land Use</u>	<u>Size</u>	<u>Unit</u>	<u>Number of Trips</u>			
			<u>Weekday Afternoon</u>		<u>Weekend Afternoon</u>	
			<u>Enter</u>	<u>Exit</u>	<u>Enter</u>	<u>Exit</u>
Hotel	1032	Rooms	144	155	144	135
Shopping Center	20,000	Sq. Ft.	55	56	28	78
Golf Course	200	Acres	35	66	35	66
Kahuku Villages	177	Dwellings	118	67	92	82
Total Trips			352	344	299	361

¹ATA trip generation rates

²ITE trip generation rates

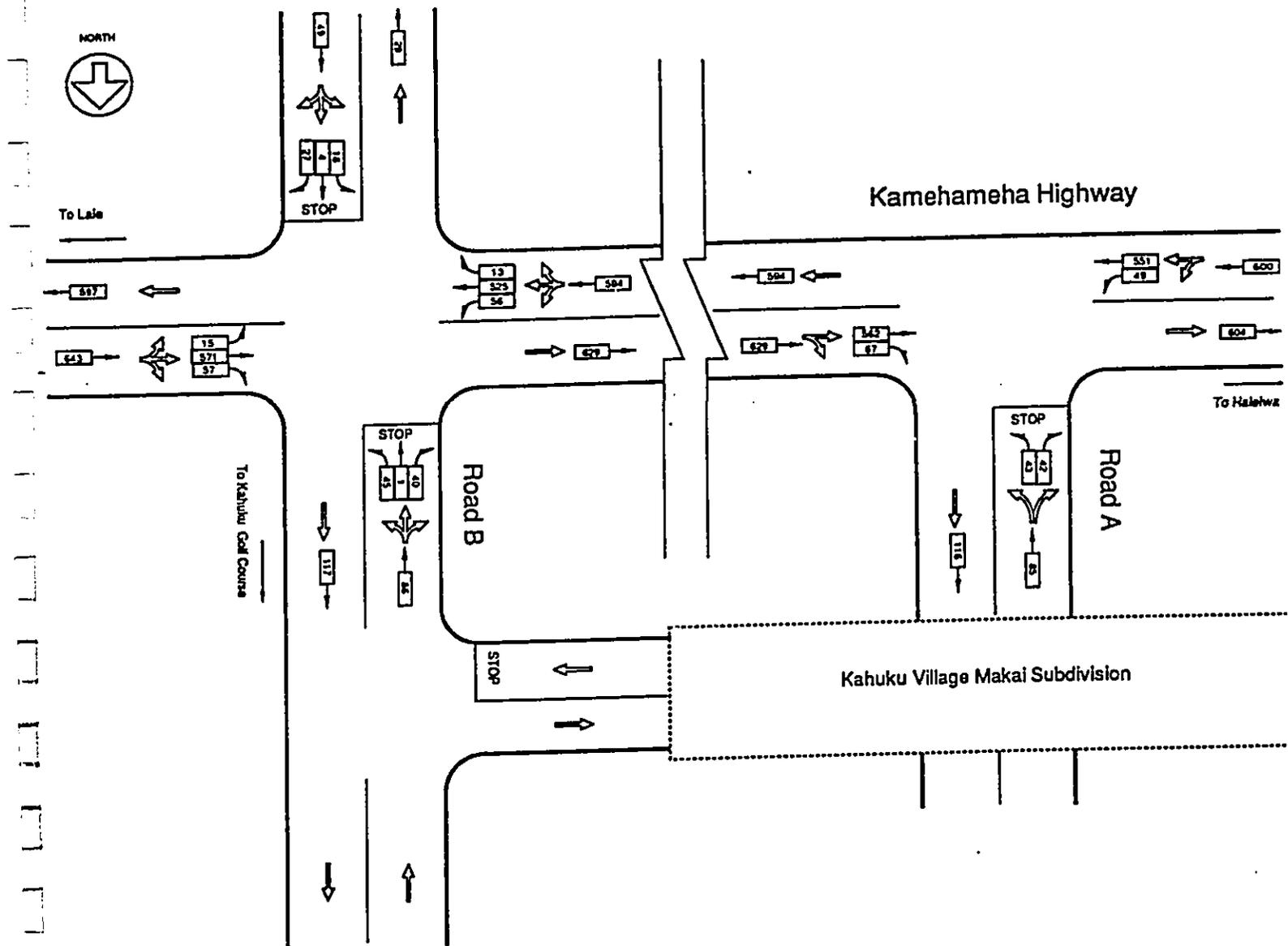


Figure 6. 1993 Weekday Afternoon Peak Hour
Forecast Traffic Without Project

Project Generated Traffic

The three-step procedure of trip generation, trip distribution and traffic assignment was used to forecast future peak hour traffic from the proposed project.

The trip generation step calculates the number of trips which would be generated during the weekday and weekend afternoon peak hours by the proposed project. The number of trips were calculated from the ITE Trip Generation Report (Fourth Edition, 1987) for 87 single family dwellings.

Table 2 shows the number of trips generated by the proposed land uses during the weekday and weekend afternoon peak hours using the ITE trip generation data. The trip generation data for single family dwellings for weekday and weekend afternoon peak generation periods were used to generate the project traffic.

Table 2. Trip Generation for Project
87 Single Family Dwellings

	<u>Dwellings</u>	<u>Weekday Afternoon</u> <u>Enter</u>	<u>Exit</u>	<u>Weekend Afternoon</u> <u>Enter</u>	<u>Exit</u>
Trip Rates		0.70	0.40	0.59	0.52
Number of Trips	87	61	35	51	45

The trip distribution and traffic assignment steps allocate the project generated trips to the different directions of travel and specific turning movements on the roadway. The existing travel patterns were used to distribute the traffic generated from the project. Existing patterns indicate that 55% of the traffic is to/from Laie and the remaining 45% is to/from Haleiwa. The project generated traffic was allocated using the 55/45 split.

Total Traffic

The ambient traffic volumes for the year 1993 shown on Figures 6 and 7 were added to the project generated volumes to obtain the total forecast volumes with the project. Figures 8 and 9 show the resulting turning movement volumes *with* the project.

Table 3 shows the weekday existing and forecasted afternoon peak hour traffic turning movements with and without the project at the study intersections. Table 4 shows the weekend existing and forecasted afternoon peak hour traffic turning movements with and without the project at the study intersections.

Table 3. Weekday Afternoon Peak Hour Forecast Traffic

<u>Turning Movement</u>		<u>Existing Traffic 1989</u>	<u>Without Project 1993</u>	<u>With Project 1993</u>
<i>Kamehameha Highway and Road "A"</i>				
Kamehameha Highway				
Eastbound (To Laie)	TH	370	551	554
	LT	13	49	77
Westbound (To Haleiwa)	TH	407	562	564
	RT	32	67	94
Road "A"				
Southbound(Maukabound)	LT	23	43	58
	RT	22	42	58
<i>Kamehameha Highway and Road "B"</i>				
Kamehameha Highway				
Eastbound (To Laie)	LT	32	56	59
	TH	348	525	540
	RT	13	56	13
Westbound (To Haleiwa)	LT	15	15	15
	TH	395	571	598
	RT	34	57	60
Road "B"				
Southbound(Maukabound)	LT	32	45	47
	TH	1	1	1
	RT	26	40	42
Northbound (Makaibound)	LT	18	18	18
	TH	4	4	4
	RT	27	27	27

Table 4. Weekend Afternoon Peak Hour Forecast Traffic

<u>Turning Movement</u>		Existing	Without	With
		Traffic <u>1989</u>	Project <u>1993</u>	Project <u>1993</u>
<i>Kamehameha Highway and Road "A"</i>				
Kamehameha Highway				
Eastbound (To Laie)	TH	441	626	628
	LT	12	37	58
Westbound (To Haleiwa)	TH	416	561	563
	RT	14	44	69
Road "A"				
Southbound(Maukabound)	LT	18	45	68
	RT	15	37	55

Kamehameha Highway and Road "B"

Kamehameha Highway				
Eastbound (To Laie)	LT	24	41	43
	TH	432	627	650
	RT	3	3	3
Westbound (To Haleiwa)	LT	13	13	13
	TH	400	560	585
	RT	11	31	34
Road "B"				
Southbound(Maukabound)	LT	23	41	43
	TH	0	0	0
	RT	25	40	42
Northbound (Makaibound)	LT	5	5	5
	TH	0	0	0
	RT	11	11	11

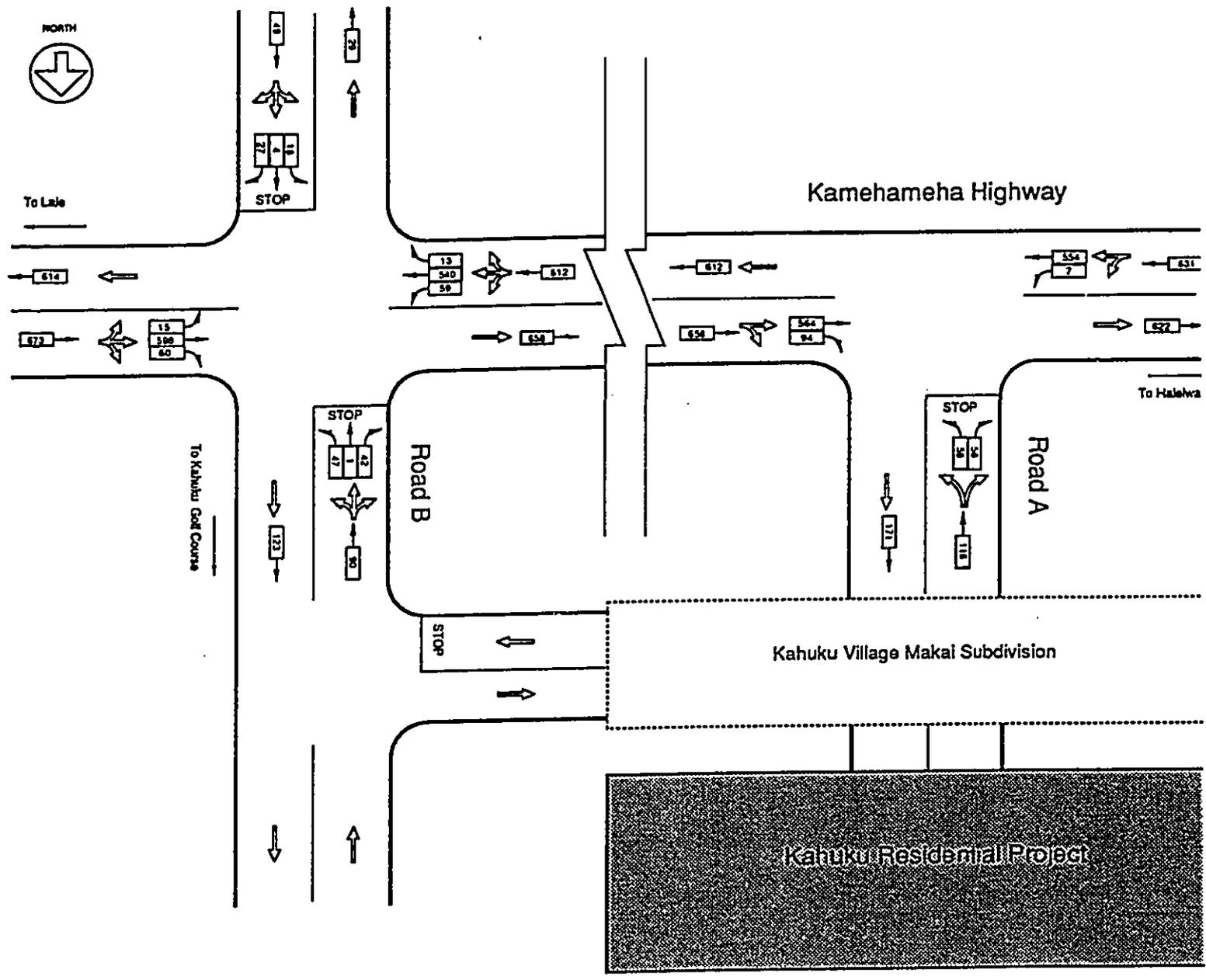


Figure 8. 1993 Weekday Afternoon Peak Hour Forecast Traffic With Project

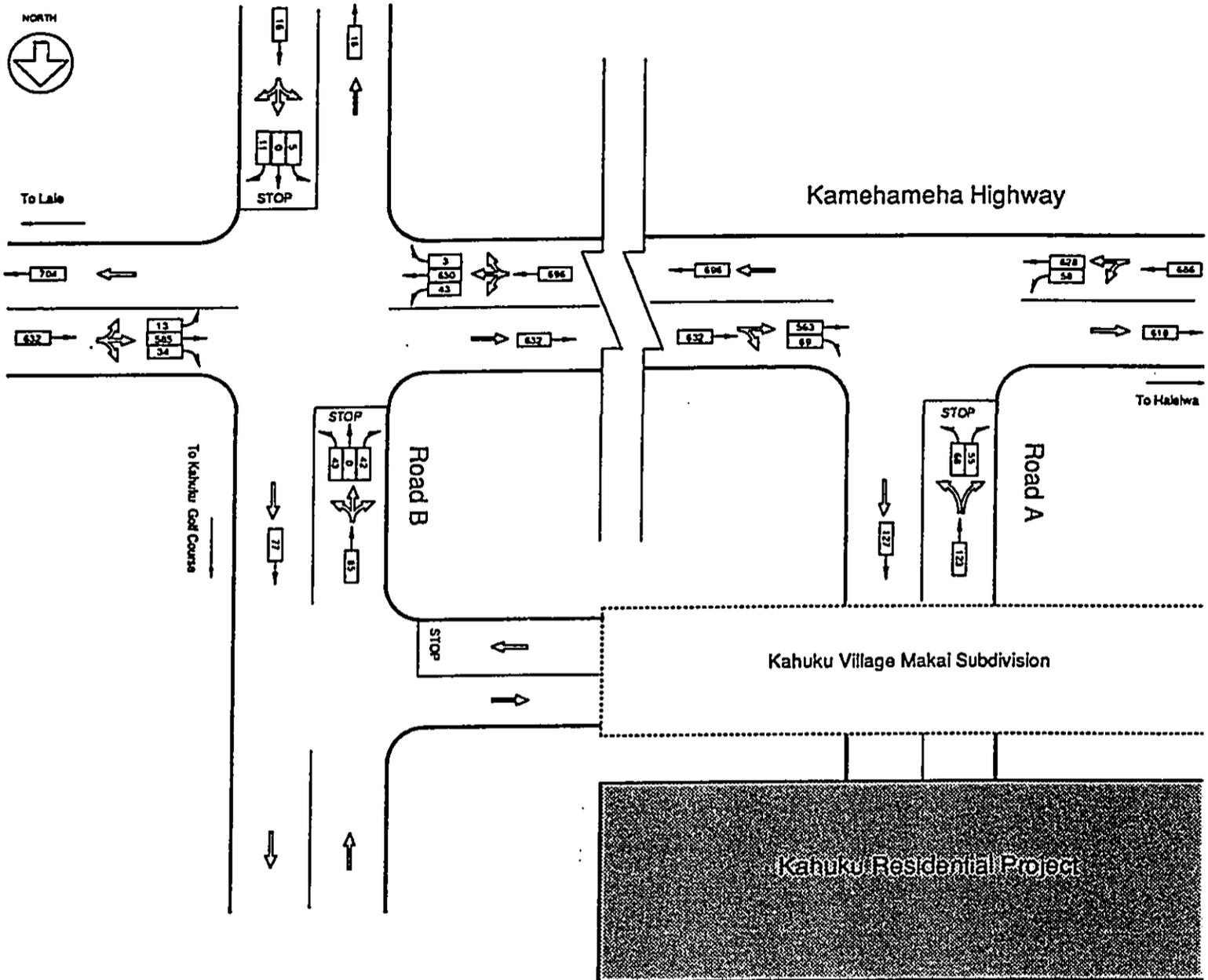


Figure 9. 1993 Weekend Afternoon Peak Hour Forecast Traffic With Project

TRAFFIC IMPACT ANALYSIS

Impacts on traffic resulting from the project were measured by the change in Level-of-Service (LOS) for the study intersections for traffic conditions with and without the project. The existing traffic, the ambient traffic, and total traffic with project were analyzed. The methodologies for analyzing unsignalized intersections from the Highway Capacity Manual, Special Report 209 (1986) were used.

The intersections of Kamehameha Highway with Road "A" and "B" were analyzed using the Unsignalized Intersection analysis. This analysis method is based on the estimated number of turning movements that could occur through a conflicting traffic stream for stop or yield controlled turning movements. The LOS is determined by the amount of reserve capacity for a turning movement.

The methodology for unsignalized intersection analysis yields levels of service ranging from A to F. The LOS for the traffic movements at an unsignalized intersection, summarized in Appendix A, is classified into six categories ranging from little or no delay (LOS A) to extreme delays (LOS F). The results of the analysis are summarized on Tables 5 and 6.

Presently, the study intersections are operating with average delays or better for all turning movements during the weekday and weekend afternoon peak hours. The left turn movements from Kamehameha Highway into Roads "A" and "B" operate with little or no delays (LOS A).

By 1993 without the project, the left turn movement from Kamehameha Highway into Roads "A" and "B" will continue to operate at LOS A. Kamehameha Highway through traffic will experience little or no delays. The LOS, however, for vehicles attempting to

exit Road "A" and "B" onto Kamehameha Highway will worsen. Road "A" and "B" will operate at LOS E and LOS D, respectively, with long delays during the weekday and weekend afternoon peak hour. This increased delay is due in part to an increase in traffic along Kamehameha Highway as well traffic generated from the Kahuku Villages Project.

By 1993 with the project, the left turn movement from Kamehameha Highway into Roads "A" and "B" will continue to operate at LOS A. Kamehameha Highway through traffic will experience little or no delays. The LOS for vehicles attempting to exit Road "A" and "B" onto Kamehameha Highway will worsen. Road "A" will drop from LOS E to LOS F during the weekend afternoon peak hour. During the weekday afternoon, the LOS at Road "A" will remain at LOS E. During the weekday and weekend peak hours at Road "B", the level of service will drop from LOS D to E.

Table 5. Level-of-Service for Weekday Afternoon Peak Hour

Turning Movement		Existing Traffic 1989	Without Project 1993	With Project 1993
<i>Kamehameha Highway and Road "A"</i>				
Kamehameha Highway				
Eastbound (To Laie)	LT	A	A	A
Road "A"				
Southbound (To Mauka)	LT	B	E	E
	RT	B	E	E
<i>Kamehameha Highway and Road "B"</i>				
Kamehameha Highway				
Eastbound (To Laie)	LT	A	A	A
Westbound (To Haleiwa)	LT	A	A	A
Road "B"				
Southbound (To Mauka)	LT	C	D	D
	TH	C	D	D
	RT	C	D	D
Northbound (To Makai)	LT	B	D	D
	TH	B	D	D
	RT	B	D	D

Table 6. Level-of-Service for Weekend Afternoon Peak Hour

Turning Movement		Existing Traffic 1989	Without Project 1993	With Project 1993
<i>Kamehameha Highway and Road "A"</i>				
Kamehameha Highway				
Eastbound (To Laie)	LT	A	A	A
Road "A"				
Southbound (To Mauka)	LT	C	E	F
	RT	C	E	F
<i>Kamehameha Highway and Road "B"</i>				
Kamehameha Highway				
Eastbound (To Laie)	LT	A	A	A
Westbound (To Haleiwa)	LT	A	A	A
Road "B"				
Southbound (To Mauka)	LT	B	D	D
	TH	B	D	D
	RT	B	D	D
Northbound (To Makai)	LT	B	C	C
	TH	B	C	C
	RT	B	C	C

CONCLUSIONS AND RECOMMENDATIONS

The proposed Kahuku Residential Subdivision will not significantly impact the traffic flow on Kamehameha Highway in 1993 when the project is expected to be completed.

The results of the analysis show that the project will cause *little or no delay* (LOS A) to traffic along Kamehameha Highway during the weekday and weekend afternoon peak hours. The left turn traffic into Road "A" and Road "B" from Kamehameha Highway will remain at LOS A *without or with* the project traffic.

By 1993 even without the project, the LOS for vehicles attempting to exit Road "A" and "B" onto Kamehameha Highway will operate with long delays during the weekday and weekend afternoon peak hours. Vehicles exiting Road "A" and "B" will operate at LOS E and LOS D, respectively. This increased delay is due in part to an increase in traffic along Kamehameha Highway as well traffic generated from the proposed Kahuku Village Makai Subdivision.

With the project, the LOS for the vehicles attempting to exit Road "A" onto Kamehameha Highway will worsen. The LOS for vehicles exiting Road "A" will drop from LOS E to LOS F during the weekend, but remain at LOS E during the weekday. The LOS for vehicles exiting Road "B" will remain at LOS D for the weekday and weekend afternoon peak hours. The delays for drivers exiting Road "A" and "B" are expected only during the peak hours.

To minimize the impact of the project, we recommend that exclusive right and left-turn lanes be provided along Road "A" for traffic exiting onto Kamehameha Highway. This will permit drivers attempting right turns to bypass the left turning vehicles and decrease delays for vehicles attempting right turns.

Other developments such as the proposed Kahuku Villages Makai Subdivision will generate a substantial amount of traffic along Road "A" that will also benefit from the exclusive right and left-turn lanes. The traffic generated by the Kahuku Residential Subdivision makes up about 35% (87 vehicles) of the total traffic along Road "A" and 6% (9 vehicles) of the total traffic along Road "B". The traffic generated by the adjacent Kahuku Villages Makai Subdivision will make up about 42% (104 vehicles) of the total traffic along Road "A" and 46% (70 vehicles) of the total traffic along Road "B".

APPENDIX A

LEVEL-OF-SERVICE DEFINITIONS
FOR
UNSIGNALIZED INTERSECTIONS

DEFINITION OF LEVEL-OF-SERVICE
FOR
UNSIGNALIZED INTERSECTIONS

For unsignalized intersections, the traffic most impacted will be the minor or cross-street with the stop or yield control. The major roadway will have the right-of-way. The level-of-service is the amount of delay expected for the average vehicle desiring to cross or enter the major road. The following gives a general description of the measure.

The concept of levels of service is defined as a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers. A level of service definition generally describes these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety.

Six levels of service are defined for each type of facility for which analysis procedures are available. They are given letter designations, from A to F, with level-of-service A representing the best operating conditions and level-of-service F the worst.

Level-of-Service definitions--In general, the various levels of service are defined as follows for uninterrupted flow facilities:

Level-of-service A represents free flow. Individual users are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to maneuver within the traffic stream is extremely high. The general level of comfort and convenience provided to the motorist, passenger, or pedestrian is excellent.

Level-of-service B is in the range of stable flow, but the presence of other users in the traffic stream begins to be noticeable. Freedom to select desired speeds is relatively unaffected, but there is slight decline in the freedom to maneuver within the traffic stream from LOS A. The level of comfort and convenience provided is somewhat less than at LOS A, because the presence of others in the traffic stream begins to affect individual behavior.

Level-of-service C is in the range of stable flow, but marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by

interactions with others in the traffic stream. The selection of speed is now affected by the presence of others, and maneuvering within the traffic stream requires substantial vigilance on the part of the user. The general level of comfort and convenience declines noticeably at this level.

Level-of-service D represents high-density, but stable, flow. Speed and freedom to maneuver are severely restricted, and the driver or pedestrian experiences a generally poor level of comfort and convenience. Small increases in traffic flow will generally cause operational problems at this level.

Level-of-service E represents operating conditions at or near the capacity level. All speeds are reduced to a low, but relatively uniform value. Freedom to maneuver within the traffic stream is extremely difficult, and it is generally accomplished by forcing a vehicle or pedestrian to "give way" to accommodate such maneuver. Comfort and convenience levels are extremely poor, and driver or pedestrian frustration is generally high. Operations at this level are usually unstable, because small increases in flow or minor perturbations within the traffic stream will cause breakdowns.

Level-of-service F is used to define forced or breakdown flow. This condition exists wherever the amount of traffic approaching a point exceeds the amount which can traverse the point. Queues form behind such locations. Operations within the queue are characterized by stop-and-go wave, and they are extremely unstable. Vehicles may progress at reasonable speeds for several hundred feet or more, then be required to stop in a cyclic fashion. Level-of-service F is used to describe the operating conditions within the queue, as well as the point of the breakdown. It should be noted, however, that in many cases operating conditions of the vehicles or pedestrians discharged from the queue may be quite good. Nevertheless, it is the point at which arrival flow exceeds discharge flow which causes the queue to form, and level-of-service F is an appropriate designation for such points.

These definitions are general and conceptual in nature, and they apply primarily to uninterrupted flow. Levels of service for interrupted flow facilities vary widely in terms of both the user's perception of service quality and the operational variables used to describe them.

APPENDIX B

MANUAL TRAFFIC COUNT DATA

APPENDIX B

MANUAL TRAFFIC COUNT DATA

Date: December 2, 1989

Saturday

Locations: Kamehameha Highway with Road "A" and "B"

Time (am)	Kamehameha Highway				Road "A"	
	Eastbound		Westbound		Southbound	
	LT	TH	TH	RT	LT	RT
1:30-1:45	7	91	89	3	5	2
1:45-2:00	1	97	109	3	3	4
2:00-2:15	2	98	108	3	5	2
2:15-2:30	2	107	94	2	4	1
2:30-2:45	5	115	130	3	5	5
2:45-3:00	3	121	98	6	4	7
3:00-3:15	2	94	96	6	5	5
3:15-3:30	4	107	105	3	2	4
Peak Hour						
Totals	12	441	416	14	18	15

Time (pm)	Kamehameha Highway						Road "B"					
	Eastbound			Westbound			Northbound			Southbound		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
1:30-1:45	4	92	0	2	89	6	1	0	2	4	0	2
1:45-2:00	7	93	0	4	104	4	1	1	3	6	0	7
2:00-2:15	6	97	0	2	101	3	0	0	3	7	0	3
2:15-2:30	7	103	1	4	90	3	1	0	3	7	0	7
2:30-2:45	5	114	1	3	112	1	2	0	2	4	0	3
2:45-3:00	6	118	1	4	97	4	2	0	3	5	0	5
3:00-3:15	7	89	1	3	97	3	0	0	3	5	0	5
3:15-3:30	1	108	1	2	105	10	1	0	1	3	0	2
Peak Hour												
Totals	24	432	3	13	400	11	5	0	11	23	0	25

Date: December 6, 1989

Wednesday

Locations: Kamehameha Highway with Road "A" and "B"

Time (am)	Kamehameha Highway				Road "A"	
	Eastbound		Westbound		Southbound	
	LT	TH	TH	RT	LT	RT
1:30-1:45	4	100	80	6	5	6
1:45-2:00	4	75	101	5	6	6
2:00-2:15	1	87	107	7	4	3
2:15-2:30	1	83	96	5	4	7
2:30-2:45	6	98	105	11	10	4
2:45-3:00	5	106	114	9	5	8
3:00-3:15	1	89	85	7	4	1
3:15-3:30	1	102	81	8	8	6
Peak Hour Totals	13	370	407	32	23	22

Time (pm)	Kamehameha Highway						Road "B"					
	Eastbound			Westbound			Northbound			Southbound		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
1:15-1:30	5	83	0	4	76	2	7	0	11	5	1	5
1:30-1:45	3	78	0	8	99	7	4	0	18	9	0	6
1:45-2:00	7	81	0	5	108	8	3	0	5	6	1	5
2:00-2:15	8	80	1	2	90	9	5	1	6	5	0	6
2:15-2:30	9	89	1	4	99	6	5	1	5	11	0	6
2:30-2:45	8	98	1	4	98	11	5	2	11	10	0	9
2:45-3:00	9	77	1	4	75	5	4	1	8	6	0	6
3:00-3:15	8	93	1	0	71	15	9	3	16	8	1	3
Peak Hour Totals	32	348	13	15	395	34	18	4	27	32	1	26

PROPOSED KAHUKU RESIDENTIAL

APPENDIX E

**AVIFAUNAL AND FERAL MAMMAL
SURVEY OF A PROPOSED
RESIDENTIAL SITE, KAHUKU, OAHU**

Phillip L. Bruner

APPENDIX E

AVIFAUNAL AND FERAL MAMMAL SURVEY OF A PROPOSED RESIDENTIAL SITE, KAHUKU, OAHU

Prepared for

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By

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13 November 1989

AVIFAUNAL AND FERAL MAMMAL SURVEY OF A PROPOSED
RESIDENTIAL SITE, KAHUKU, OAHU

INTRODUCTION

The purpose of this report is to summarize the findings of a one day (8 November 1989) faunal field survey of 15 acres located makai of the Kahuku Sugar Mill, Kahuku, Oahu (see Fig.1). In addition references to pertinent literature are also provided in order to give a more comprehensive view of the potential wildlife that might occur in the area. The objectives of the faunal survey were to:

- 1- Determine what species of birds and mammals occur or potentially might occur on the property.
- 2- Determine, within the time constraints available, the relative abundance of each species.
- 3- Check for the presence of any endangered species and note their particular use of the site ie. feeding, nesting, loafing.
- 4- Identify any special habitats that may occur on the property and suggest ways in which they might be protected.

SITE DESCRIPTION AND METHODS OF SURVEY

The proposed project site of approximately 15 acres is located makai of Kamehameha Highway and the Kahuku Sugar Mill (Fig.1). Vegetation in this area consists of a variety of introduced plants. Some of the more abundant species include: Ironwood (Casuarina spp.), Indian Plucheas (Plucheas indica), Hau (Hibiscus tiliaceus) and Koa Haoli (Leucana leucocephala). Most of the site is heavily overgrown with grass and weeds. Several old buildings, some deserted and some still in use, are scattered about the area.

The survey was conducted by walking the perimeter of the property and one transect through the center of the site. A series of census stations were established and eight minute counts of all birds seen and heard at these stations were recorded (Fig.1). Tallys of birds observed between these census stations were also kept. Observations were made on surrounding lands as well because of the mobile nature of birds. From these data relative abundance estimates were calculated (see Table One). Mammals were surveyed by visual means and by noting the presence of scats and tracks. No trapping of mammals was attempted in order to determine their relative abundance.

Scientific names used in this report follow those given in the most recent American Ornithologist's Union Checklist (A.O.U. 1983), Hawaii's Birds (Hawaii Audubon Society 1989), A Field Guide to the Birds of Hawaii and the Tropical Pacific (Pratt et al. 1987),

Mammal species of the World (Honacki et al. 1982), Tropical Trees of the Pacific (Hargreaves and Hargreaves 1970) and Hawaiian Coastal Plants (Merlin 1980).

RESULTS AND DISCUSSION

Endemic Species:

The nearby James Campbell National Wildlife Refuge, Kii Unit is the home of four endemic and endangered waterbird species: Common Moorhen (Gallinula chloropus sandvicensis), American Coot (Fulica americana alai), Black-necked Stilt (Himantopus mexicanus knudseni) and Koloa (Anas wyvilliana). No wetlands exist on the property, thus the only likely occurrence of these species would be when they might fly over the site.

The endemic Pueo or Short-eared Owl (Asio flammeus sandwichensis) is listed by the State of Hawaii as endangered on Oahu. One Pueo was observed hunting over open land to the north west of the site. This species of owl forages during the day as well as at night.

Indigenous Species:

The only indigenous species recorded was the Black-crowned Night Heron (Nycticorax nycticorax). Two night heron flew over the property on their way to the wildlife refuge during the survey. This species is the only native waterbird in Hawaii that is not listed as endangered. Their statewide population has likely increased in

recent years due to the development of aquaculture.

Two species of migratory shorebirds were recorded during the survey, the Ruddy Turnstone (Arenaria interpres) and Pacific Golden Plover (Pluvialis fulva). The latter species is known to be very site-faithful and territorial (Johnson et al. 1981, 1989). A total of 18 plover and 12 turnstone were observed. These birds were seen flying over the property and on the open ground to the NNW of the site.

Introduced (Exotic) Species:

A total of 15 species of exotic birds were recorded on the survey. Table One shows the relative abundance of each species based on the data from this one day survey. Two species not recorded but likely present on or near the property are the Common Barn Owl (Tyto alba) and Java Sparrow (Padda oryzivora) (Bruner 1989, Pratt et al. 1987).

Feral Mammals:

Mongoose (Herpestes auropunctatus) and cats were both seen on the property. Rats and mice were not recorded but undoubtedly are present at this site. Derelict buildings and grass fields are favorite haunts of these rodents. This survey found no unusual concentrations of mammals. The endemic and endangered Hawaiian Hoary Bat (Lasiurus cinereus semotus) is known from Oahu (Tomich 1986) but was not recorded on this survey.

CONCLUSIONS AND RECOMMENDATIONS

A one day survey of a small property can provide a narrow view of the use of the habitat by wildlife. Species composition and abundance vary depending on the time of year and the availability of resources. Some species are common for a time and then decline or disappear altogether (William 1987). The conclusions that can be drawn from this field survey are:

- 1- This disturbed area provides habitat for the typical array of introduced species of birds one would expect to find in this environment on Oahu. The relative abundance of each species was not out of line with expectations for this area.
- 2- Native birds, both resident and migratory, were observed in and around the property. The endangered waterbirds from the nearby wildlife refuge occasionally fly over the site. Shorebirds like plover and turnstone utilize open grassy fields and roadsides.
- 3- Mammal activity in the area seems to be typical of this type of habitat on Oahu.

RECOMMENDATION

No special habitats were found on the property, however, the nearby wildlife refuge is an essential property for native endangered waterbirds. Care should be taken in the development of this proposed residential site that no harmful wastes are allowed to contaminate

the water supply of the refuge. The noise and dust from construction might also be a concern for wildlife at the refuge. This might be minimized to some degree by the erection of a temporary barricade. At some point in time the refuge will need to construct and maintain a dog proof fence. At present the boundary fence of the refuge is easily violated by dogs and people and is in a poor state of repair. As residential units are constructed nearby the number of dogs and children will likely increase and may place an additional strain on the ability of the wetland to provide an adequate refuge for waterbirds. Improving the fence and planting a visual buffer of trees, such as Ironwood, may eventually be the answer to this potential problem.

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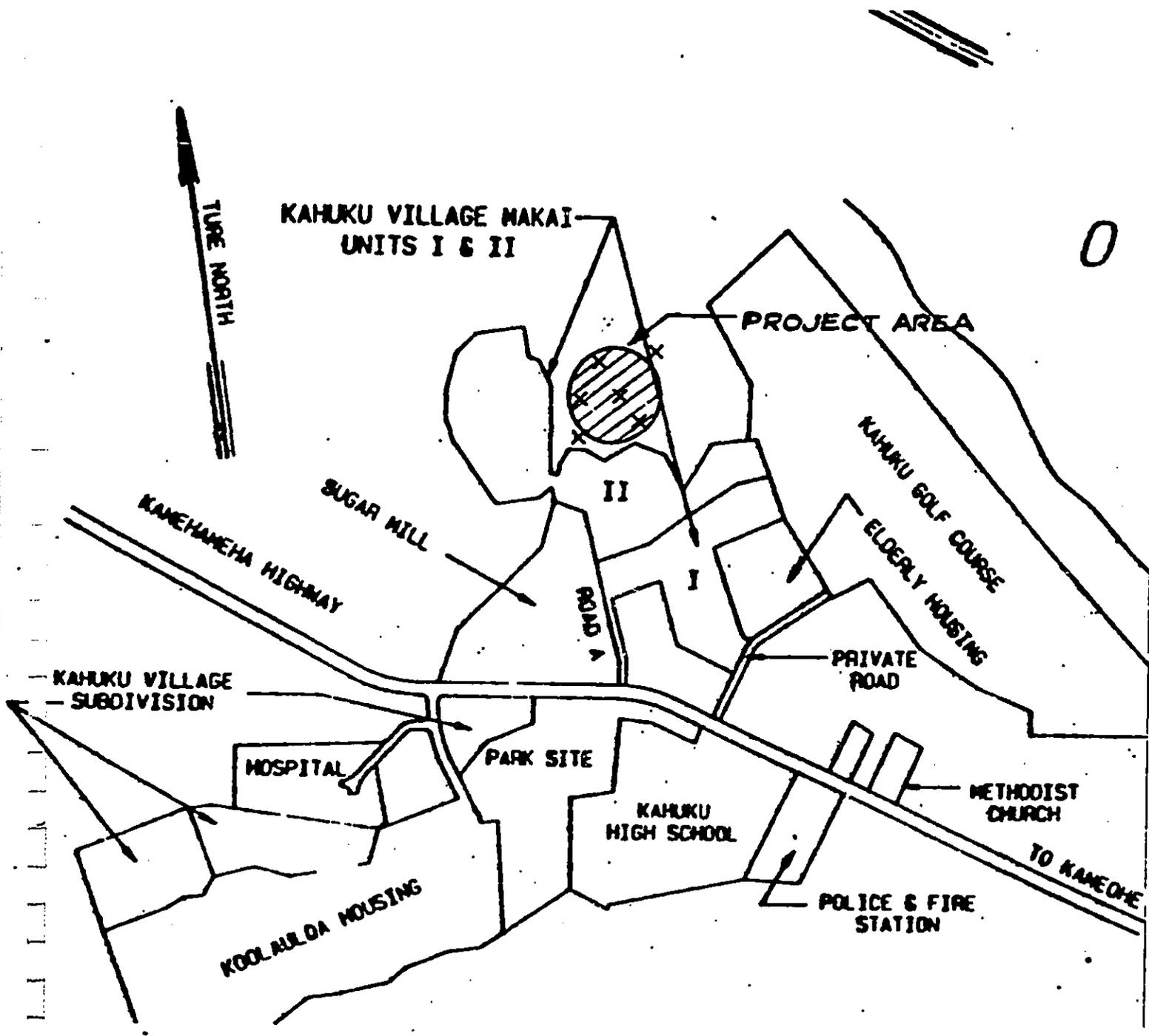


Fig. 1. Project site with location of census stations marked by a "X".

TABLE 1

Relative abundance of exotic birds recorded on proposed residential property, Kahuku, Oahu.

COMMON NAME	SCIENTIFIC NAME	RELATIVE ABUNDANCE*
Cattle Egret	<u>Bulbulcus ibis</u>	A = 12
Ring-necked Pheasant	<u>Phasianus colchicus</u>	U = 2
Spotted Dove	<u>Streptopelia chinensis</u>	U = 4
Zebra Dove	<u>Geopelia striata</u>	A = 11
Common Myna	<u>Acridotheres tristis</u>	A = 15
Northern Cardinal	<u>Cardinalis cardinalis</u>	U = 2
Red-crested Cardinal	<u>Paroaria coronata</u>	C = 6
White-rumped Shama	<u>Copsychus malabaricus</u>	R = 1
Red-vented Bulbul	<u>Pycnonotus cafer</u>	A = 13
Japanese White-eye	<u>Zosterops japonicus</u>	A = 10
Japanese Bush-warbler	<u>Cettia diphone</u>	R = 1
House Sparrow	<u>Passer domesticus</u>	U = 4
House Finch	<u>Carpodacus mexicanus</u>	A = 12
Nutmeg Mannikin	<u>Lonchura punctulata</u>	C = 6
Common Waxbill	<u>Estrilda astrild</u>	C = 9

* (see page 9 for key to relative abundance symbols)

KEY TO TABLE 1

Relative abundance = Determined by frequency on eight minute counts in appropriate habitat. Number which follows is average of all counts.

A = abundant (10+)

C = common (5-10)

U = uncommon (1-5)

R = Rare or recorded only once (number which follows is total recorded during the field survey)

SOURCES CITED

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PROPOSED KAHUKU RESIDENTIAL

APPENDIX F

**ARCHAEOLOGICAL
RECONNAISSANCE REPORT FOR
KAHUKU RESIDENTIAL,
TMK: 5-6-02; POR 16**

Archaeological Consultants of Hawaii, Inc.

APPENDIX F



ARCHAEOLOGICAL CONSULTANTS
of
HAWAII

59-624 Pupukea Rd.
Haleiwa, Hawaii 96712
(808) 638-7442

JOSEPH KENNEDY
Archaeologist

Mr. William Wanket
William Wanket, Inc.
1001 Bishop St. Suite 660
Honolulu, Hawaii 96813

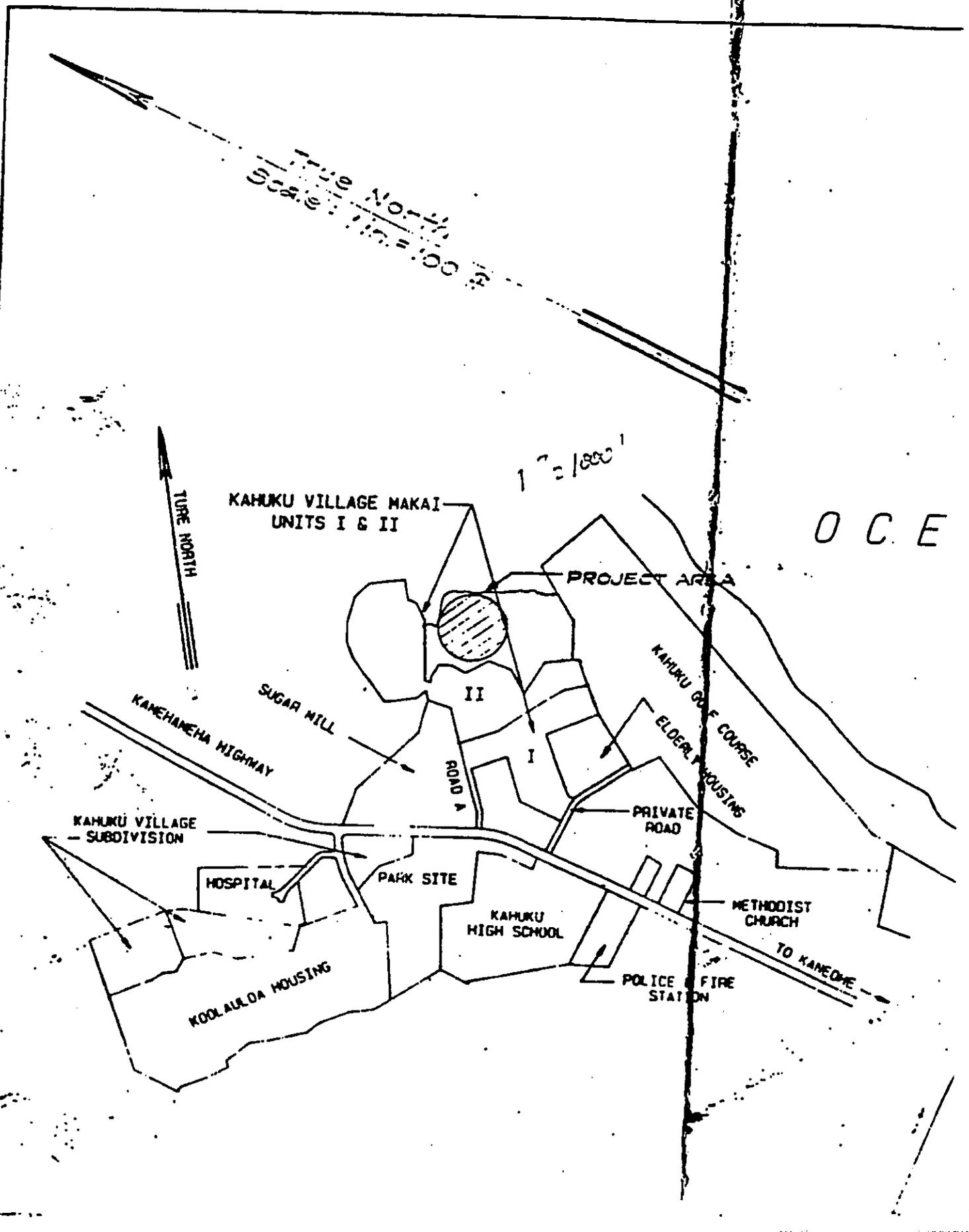
December 3, 1989

RE: Archaeological Reconnaissance Report for Kahuku
Residential, TMK: 5-6-02; por. 16.

Dear Mr. Wanket:

At the request of your office, Archaeological Consultants of Hawaii, Inc. has conducted a reconnaissance survey of 16.319 at the above location. The subject property is primarily pasture land, subdivided into several parcels with fences and a few small farm sheds. It lies between the old railroad right-of-way on the west and Kahuku Golf Course on the east. In the absence of additional maps it is difficult to be certain of exact boundaries, however, the general information applies to the surrounding environments as well and should be sufficient for this level of investigation.

Soil on this property has been classified as Jaucus sand (JaC) and is described as single grain, pale brown to very pale brown, sandy and more than 60 inches deep. Our surface descriptions may expand this to include a heavy, reddish-black clay with numerous small to medium size rocks and pebbles of volcanic origin. In some areas of the southern (mauka) portion, grading has exposed and eroded the limestone substrate, which most likely underlies most of the plain. No sand dunes were observed on the property, though tall dunes can be seen some 250 meters from the north/northwest extent of the parcel. The existing shoreline is another 250 meters beyond the start of the dunes. A loose mix of sand, clay, and limestone aggregate occurred closer to the subject property, perhaps within 100 meters.



Zane & Fukamoto re.
6074 TW n no 7.20-

Sub Tenancy
David Costa
6074.01 TW mo/mo

228
962

File Plan 1406
Ex. 3
99

Valdez Cratobel
5486 TW N. 117 Acs
C10 700 Acs

(9.517 Ac)

2600 Ac

CURB

STATE

STATE

Kahuku Village Assn.
5-89 1,410 Acs.

0.510 Ac. Ex. 4

STATE AG. = 11.3 ACS
STATE URBAN = 5.0 ACS.

KVA
4-9-5-89 0.800 Acs.

URBAN

CITY & COUNTY
21.710

OF HONOLULU
Acs.

25 Acs.

EX. 5
1,682 AC

E-186

E-176
A176
E-187

EX. 6
1,085 Ac.

alignment-shopping
st by Ord. No. 4347

Corp.
455 Acs.

968-D

Kahuku
Restaurant
5.14-92
8304 sq

KVA

CITY & COUNTY
OF HONOLULU

Elderly Housing Site
6.068 Acs.

E-182

Y

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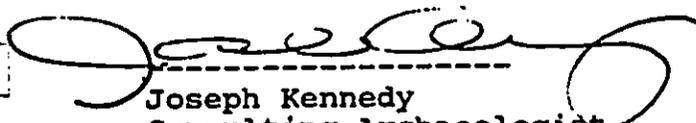
W. Wanket
Kahuku Residential
Recon. Survey
Page 2.

A review of the archaeological records indicate that no previous work has taken place on this particular piece of property. However, reconnaissance work conducted by the author earlier this year called for further work in the form of subsurface testing. Reasoning for this recommendation has to do with earlier work by Rosendahl, Bath, and others in the general vicinity that has produced evidence of previous and in some cases, early occupations.

The results of our surface investigations were negative, or in other words, we did not encounter any obvious features of historic concern. Raised mounds and platforms within the flat pasture are most likely piles of dirt and rubble pushed-up during clearing operations. Nevertheless, based on the nearness of significant archaeological sites and the dune formations (known burial areas) and the deep nature of the soil conditions, it is our opinion that a systematic subsurface testing program be undertaken to determine the presence or absence of buried deposits that may shed some light on prehistoric activity in this area, as well as any early historic materials.

If there are any questions regarding this report, please feel free to contact me.

Aloha,



Joseph Kennedy
Consulting Archaeologist

PROPOSED KAHUKU RESIDENTIAL

APPENDIX G

**VIEW ASSESSMENT, KAHUKU
RESIDENTIAL**

Michael S. Chu

APPENDIX G

VIEW ASSESSMENT
Kahuku Residential
Koolauloa, Oahu, Hawaii

prepared by: MICHAEL S. CHU, LAND ARCHITECT
prepared for: THE ESTATE OF JAMES CAMPBELL
DEC. 1989

VISUAL ASSESSMENT

1. Purpose and Context of Assessment

The purpose of this assessment is to evaluate the visual impacts of the proposed Kahuku Residential project.

This assessment is conducted within the context of (a) existing visual conditions, (b) probable existing visual conditions after construction and landscaping of recently approved adjacent projects, and (c) current State and City/County development plans and policies relating to visual quality.

Because the project is in the early stages of the land planning/permit process (DP Land Use Amendment), precise plans for the project's visual appearance (precise grading and vegetation removal, dwelling heights, bulk, color, and roof style, street landscaping, etc) are not yet finalized. Therefore, the maximum allowable building heights and other DP, zoning and subdivision controls will be assumed for the purposes of this visual assessment.

2. Project Location and General Setting

The project is located in the Kahuku community at the north end of the windward side of Oahu, in the Koolauloa DP area (see Figure 1). The property lies on the makai side of Kamehameha Highway, approximately one-fourth of a mile northeast of the old Kahuku sugar mill and is contiguous with adjacent residential zoned land. The 16.3 acre site is level and contains no significant topographic features, prominent tree masses or other stands of vegetation.

Approximately 30% (5 ac.) of the 16.3 ac. site is within the fringe of the State Land Use urban district. The balance of the site (11.3 ac.) lies within the agriculture district. Similarly, a portion of the site (approximately 3 ac.) is designated residential by the DP and zoning maps (see Figures 2, 3 & 5).

This mostly vacant site is surrounded on its west and south sides by residential tracts (the location of Kahuku Village Makai Units I and II, now occupied by dilapidated and partially abandoned housing). The northwest end of the Kahuku County Golf Course lies along the east side of the site, while the north side is next to open agricultural land.

The National Wildlife Refuge (Kii Unit) is located nearby on this open agricultural plain, approximately one-third of a mile northwest of the site. A sewage treatment plant, mixed agricultural crops and numerous aquaculture ponds also exist on the Kahuku end of this agricultural plain. A small old cemetery lies one-fourth of a mile northeast of the site, on the same coastal sand hill occupied by the Kahuku County Golf Course.

This site, along with the golf course and agricultural land, lies within the Special Management Area (SMA) boundary. The adjacent residential tracts and the Kahuku community in general are outside the SMA boundary.

The site is one-fourth of a mile from the shoreline and is not visible from the shoreline area.

3. Visual Description of Project

The proposed project consists of the construction of 87 residential lots on a 16.3 acre site. The subdivision will be consistent with City and County subdivision standards with a minimum lot size of 5000 sq. ft. The project's street will consist of one primary roadway with a 56-foot right-of-way, one secondary roadway (44-foot right-of-way), and four short local streets with cul-de-sacs (32-foot right-of-way). Site drainage, sewer and domestic water systems will be provided and located within the right-of-way.

A railroad right-of-way will be maintained along the southwest edge of the site.

4. Applicable Policies & Land Use Controls

State and City/County policies regarding public views, open space, scenic resources and overall visual quality are as follows.

Hawaii State Plan (HRS Chapter 226)

The Hawaii State Plan, recognizing the need to "...provide for wise use of Hawaii's resources and to guide the future development of the State," identifies several Goals, Objectives, Policies and Priorities for the State. Those which are relevant to this report are as follows:

SEC.226-4 State Goals

(2) A desired physical environment, characterized by beauty, cleanliness, quiet, stable natural systems, and uniqueness, that enhances the mental and physical well-being of people.

SEC.226-12 Objective and policies for the physical environment - scenic, natural beauty, and historic resources

(a) Planning for the State's physical environment shall be directed towards achievement of the objective of enhancement of Hawaii's scenic assets, natural beauty, and multicultural/historic resources.

(b) To achieve the scenic, natural beauty, and historic resources objective, it shall be the policy of this State to:

(3) Promote the preservation of views and vistas to enhance the visual and aesthetic enjoyment of mountains, ocean, scenic landscapes, and other natural features.

(5) Encourage the design of developments and activities that complement the natural beauty of the islands.

SEC.226-104 Population growth and land resources priority guidelines

(b) Priority guidelines for regional growth distribution and land resources utilization:

(10) Identify critical environmental areas in Hawaii to include but not be limited to the following: ...scenic and recreational shoreline resources; open space and natural areas; historic and cultural sites; areas particularly sensitive to reduction in water and air quality; and scenic resources.

(13) Protect and enhance Hawaii's shoreline, open spaces, and scenic resources.

General Plan, City and County of Honolulu

The General Plan for the Island of Oahu contains several "...environmental and design objectives for the general welfare and prosperity of the people of Oahu" and "...broad policies which facilitate the attainment of the objectives of the Plan." The most relevant Objectives and Policies are:

(In the area of Natural Environment)

Objective A: To protect and preserve the natural environment.

Policy 1: Protect Oahu's natural environment, especially the shoreline, valleys, and ridges, from incompatible development.

Policy 9: Protect mature trees on public and private lands and encourage their integration into new developments.

Objective B: To preserve and enhance the natural monuments and scenic views of Oahu for the benefit of both residents and visitors.

Policy 2: Protect Oahu's scenic views, especially those seen from highly developed and heavily travelled areas.

(In the area of Physical Development and Urban Design)

Objective E: To promote and enhance the social and physical character of Oahu's older towns and neighborhoods.

Policy 3: Provide and maintain roads, public facilities, and utilities without damaging the character of older communities.

Development Plans, Common Provisions

The common provisions for all of Oahu's Development Plan Areas include the following relevant general urban design principles and controls (Section 32-1.4):

(1) Public Views

Public views include views along streets and highways, mauka-makai view corridors, panoramic and significant landmark views from public places, views of natural features, heritage resources and other landmarks, and view corridors between significant landmarks.

Such public views shall be protected by appropriate building heights, setbacks, design and siting controls established in the CZC. These controls shall be determined by the particular needs of each view and applied to public streets and to both public and private structures.

The design and siting of all structures shall reflect the need to maintain and enhance available views of significant landmarks. No development shall be permitted that will block important public views.

Whenever possible, overhead utility wires and poles that significantly obstruct public views shall be relocated or placed underground.

(2) Open Space

Open space areas consist of, but are not limited to, the ocean, beaches, parks, plazas, institutional properties with park-like grounds, streams, inland bodies of water, significant land forms, golf courses, cemeteries and agricultural and preservation lands. The functions of open space areas are to provide visual relief and contrast to the built environment, to serve as outdoor space for public use and enjoyment. The preservation and enhancement of areas that are well suited to perform these functions shall be given high priority.

Open spaces that act as physical boundaries distinguishing one community from another shall be preserved.

(3) Vehicular and Pedestrian Routes

Landscaping shall be provided along major vehicular arterials and collector streets as a means to increase the general attractiveness of the community and the enjoyment of vehicular travel for visitors and residents.

(6) Existing Built-up, Single-family Residential areas

The areas designated for residential use consist of both existing built-up, single-family residential communities and areas that are considered appropriate for future residential development. New development in existing communities shall generally be limited to that which is compatible with or enhances the desired physical and social character and lifestyle.

New residential development in rural areas shall be compatible with the general rural character of the area.

(8) Rural Areas

Rural areas are characterized by a preponderance of open and agricultural lands with limited development clustered in small, low density residential areas which have a strong sense of community and a country-like environment. Large-scale agricultural operations or small farms are major economic activities and constitute the predominant land use. Business centers are generally modest in size, low in intensity of use and primarily oriented to meeting the day-to-day shopping and service needs of the surrounding area's residents.

The location and character of new development in rural areas shall be consistent with the above-described characteristics of such areas and be guided by the following principles and controls:

(A) The visual attractiveness that distinguishes rural from urban and country from city shall be maintained.

(C) Single-family dwellings at low densities shall be the predominant form of housing in residential areas. Clustering of dwellings shall be encouraged in order to promote the preservation of important natural areas and open spaces, the establishment of agricultural operations and economy in the provision of utilities and services.

(D) Developments along the shoreline and makai of arterial highways that are within 1,000 feet of the shoreline shall be generally limited to parks, agricultural operations, and single-family residential dwellings. Private developments shall include public shoreline accessways at intervals of approximately one-half mile.

Koolauloa Development Plan, Special Provisions

The Development Plan for the Koolauloa Area specifies that

"The land use pattern shown on the land use map provides for the preservation of the predominantly rural character of Koolauloa by allowing only limited single-family residential development and confining further tourist oriented development to the Kahuku Point-Kawela Bay area.

Further development within the Koolauloa area, particularly in the Kahuku Point-Kawela Bay area, is to be sensitive to the delicate coexistence between the natural scenic, recreational, and agricultural resources of the area. This is to be accomplished by minimizing adverse impacts on and preserving important agricultural lands and public views, maintaining public access to recreational areas, and providing building designs which reflect the rural character of the area.

Residents are to continue to be offered the opportunity to develop social patterns and life styles within a rural setting as expressed by neighborhoods or small housing clusters which are defined by open space boundaries and which blend into the surrounding landscape with as little disruption as possible to the scenic quality of the area."

The Urban Design Principles and Controls for Koolauloa (Section 32-7.2 of the DP) provide the following relevant Specific Urban Design Considerations:

(1) Open Space

The visibility, preservation, enhancement and accessibility of open space areas, as described in Section 32-1.4 of the development plan common provisions, shall be given high priority in the design of adjacent and nearby development in Koolauloa.

(2) Public Views

In order to protect and enhance the rural attractiveness of Koolauloa, views from public places of the lateral Koolau ridges and deep inland valleys of southern Koolauloa shall be protected wherever possible. Panoramic and continuous views from public places of the coast and the sea, as well as views of the expansive Kahuku plain, shall also be protected.

The subordinate role of the built environment with respect to the natural environment and agricultural activities shall be emphasized by the identification and protection of panoramic public views of the shore, streams, mountains and agricultural fields.

Kamehameha Highway provides the traveler with an exceptionally scenic experience. Development adjacent to the highway shall reflect the need to preserve the current panoramic roadway views of the sea, the coastline, the Koolau mountains and lateral ridges, inner valleys, and landmarks.

(3) Height Controls

The general height limits of buildings shall be as follows:

Preservation	25 feet
Agricultural	25 feet
Residential	25 feet
Low-density Apt.	30 feet
Medium-density Apt.	40 feet
Commercial	40 feet
Resort	70 feet
Industrial	40 feet

(4) Density Controls

The guidelines for densities shall be as follows:

(A) Residential. Areas designated as Residential, 12 dwelling units per net acre.

(5) Existing Built-Up, Single-Family Residential Areas

In the development of new residential areas, development controls shall provide for compatibility with existing single-family residential areas and the preservation of the general rural character of the area.

Subdivision Rules and Regulations

The City/County Subdivision Rules and Regulations contain the following relevant Sections:

Section 1-102. Purpose

The purpose of these rules and regulations is to regulate and control the subdivision and consolidation of land for the following purposes; all of which promote the general welfare and an environment that is safer, healthier, more convenient, efficient, and attractive:

(d) To preserve, enhance and improve the natural amenities, qualities, and environment of the community by securing a harmonious relationship between the subdivision and its environment.

Sections 5-512 and 513. Planting

To preserve and enhance scenic character and to prevent environmental problems in the subdivision and the surrounding community, subdivision construction plans shall include a planting plan...and...a Street Tree Planting Plan for each subdivision indicating the quantities, locations, types, size and planting specifications which shall be reviewed and approved by the [DLU] Director and Director of Recreation.

SMA Coastal View Study Considerations

As described in the Coastal View Study for the City and County of Honolulu (Chu and Jones, 1987), the site lies in Section A of the Kahuku Viewshed, wherein "the visual quality of this section is based primarily on the visual intactness of the agricultural land and open spaces surrounding the coastal highway." The study recommends maintaining existing view openings and preserving the rural character along the coastal highway.

5. Existing Visual Conditions

The project area lies on the long, flat Kahuku Plain. The only local topographic relief is provided by low rolling hills mauka of Kamehameha Highway and by a 20 foot high stabilized sand dune paralleling the shoreline and lying immediately east of the project site.

The Kahuku County Golf Course lies adjacent and makai of the amendment area. Except for the sand dunes, the site, its surrounding terrain and Kamehameha Highway have essentially the same elevation.

The only potential view of the site from public roadways is from Kamehameha Highway west of Kahuku. As shown in Photos A and B, however, the project area is substantially screened from view by several rows of Ironwood trees, other shrub masses (koa-haole, castor bean, banana and papaya) and existing houses within the Kahuku Village.

Similar vegetative screening occurs along the west, east and southern edges of the site (Photos C, E and G), thus effectively screening the property from all adjacent areas.

(Some of these adjacent dilapidated houses are still occupied, while others have been abandoned.) If/when Kahuku Village Makai Unit II is built, the then-existing view along the west and south sides of the site would be similar to that seen in Photo D. The vegetation and fencing separating the two sites would remain as is. This vegetation screen, dominated by ironwood, is approximately 50 feet high. Utility poles and lines traversing the site (Photos A and C) are 35 feet high, and are thus generally screened from outside view.

The east side of the subject property abuts the Kahuku County Golf Course. Views of the site from this public facility are almost entirely blocked, however, by a dense linear mass of vegetation and by the site's lower elevation (see Photos G, H and I). This dense vegetation consists primarily of Sea Grape, Hau, Ironwood, Coconut palm, Banana and Beach Naupaka. This important vegetation screen is discontinuous in a few places, allowing limited views into the site from the golf course (see Photo I).

The site is completely open to view along its north side, and is continuous with adjacent agricultural open space. This exposure is of no consequence, however, since there is no roadway or other public usage in the open space area north and west of the site.

The visual quality within the site is very low (Photos E, F and G). It has been used extensively in the past for agriculture and dumping of refuse.

6. Potential Visual Impacts & Mitigative Measures

Short-Term Visual Impacts

6.1 There would be a locally significant visual disruption during project clearing, grading and construction, due to vegetation removal, stockpiling of materials and occasional dust. The extent of human exposure to such short-term visual disruption is relatively low, being limited to adjacent residents within the Kahuku Village, golfers and occasional beach-goers at the northwest end of the golf course.

Mitigative Measures - The magnitude of this impact is attenuated by the existing low visual quality of the site. Adherence to the County's Soil Erosion Standards and Guidelines (Department of Public Works, 1975) and other standard construction impact controls (dust control, temporary vegetation, erosion controls, construction timing, etc) will keep such unavoidable visual impacts within acceptable limits.

Long-Term Visual Impacts

6.2 The visual impact of greatest concern is the project's potential effect on open space views across the agricultural fields as seen from the coastal highway. Because the site is substantially screened from highway views by existing vegetation and by distance, the proposed project will have no significant visual impact on existing open space and highway views. The existing sewage treatment plant building (Photo A) will continue to be the only intrusion into this portion of the area's agricultural open space.

Mitigative Measures - Maintain existing Ironwood trees for visual screening and landscape purposes. No additional mitigations are needed. The Koaia DP residential height limit of 25 feet ensures that the project structures will be much below the existing vegetation screens between the site and Kamehameha Highway.

6.3 The site is visually isolated contains no significant natural land forms or scenic resources and does not conflict with existing State and City/County policies and objectives regarding public views or scenic resources. Public views, open space and the rural character of the region will not be significantly affected or impacted, nor will the proposed project affect existing adequate public access to the shoreline area.

Mitigative Measures - No additional mitigations are needed.